United States
Department of
Agriculture

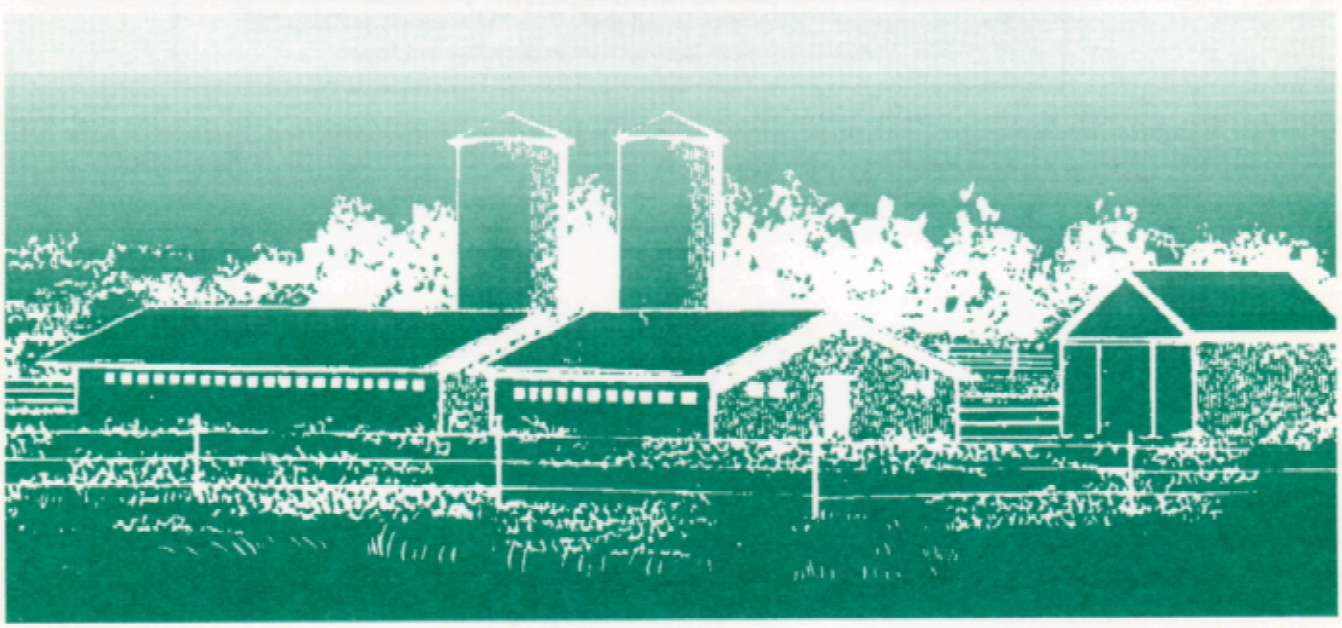
Economic
Research
Service

Agricultural
Economic
Report
Number 695

The New Generation of American Farmers

Farm Entry and Exit Prospects for the 1990's

Fred Gale



It's Easy To Order Another Copy!

Just dial 1-800-999-6779. Toll free in the United States and Canada. Other areas, call 1-703-834-0125.

Ask for *The New Generation of American Farmers: Farm Entry and Exit Prospects for the 1990's* (AER-695).

The cost is $9.00 per copy. Add 25 percent for shipping to foreign addresses (including Canada). Charge your purchase to your Visa or MasterCard. Or send a check (made payable to ERS-NASS) to:

ERS-NASS
341 Victory Drive
Herndon, VA 22070

We'll fill your order by first-class mail.

The New Generation of American Farmers: Farm Entry and Exit Prospects for the 1990's. By Fred Gale, Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economics Report No. 695.

Abstract

Between 1992 and 2002, more than 500,000 older farmers will exit, to be replaced by about 250,000 new young farmers. Farm numbers are expected to decline about 1.3 percent annually, reaching about 1.7 million by 2002. Farm entries will likely continue at low levels. The decline in farm numbers is not a threat to the Nation's food supply. The complex workings of land and credit markets will determine how farm assets of retiring farmers are transferred to the next generation. The outcome of this process has important implications for the structure of farming in the next century.

Keywords: Farm entry, farm exit, farm numbers, farm demographics, farmer age

Acknowledgments

The author thanks John Blackledge and other Census Bureau personnel for providing access to Census longitudinal data. Susan Bentley provided data for table 18. Calvin Beale, Ron Durst, Dave Harrington, Fred Hines, Steve Koenig, Neal Peterson, and Leslie Whitener provided useful suggestions for improving the manuscript.

1301 New York Ave., NW
Washington, DC 20005-4788

October 1994

Contents

Summary

More than 500,000 older farmers will exit the farm sector between 1992 and 2002, to be replaced by about 250,000 new young farmers. Farm numbers may decrease to about 1.7 million by 2002, down from 2.1 million in 1987. The decline in farm numbers does not threaten the Nation's food supply, because each farm operator today produces a larger output than in past decades. This report projects farm entries to continue at low levels.

During the 1950's and 1960's, farm numbers declined by more than 100,000 per year, as farmers of all ages left to pursue nonfarm occupations. During the 1970's, the exodus from farming slowed, as the income gap between farm and nonfarm households narrowed. In recent years, shortrun economic conditions that affected the balance between retiring older farmers and new younger farmers have influenced the rate of decline. Strong entry by young farmers during the 1970's stabilized farm numbers, but lower entry during the 1980's accelerated the decline. Farm numbers have continued declining in the 1990's.

Declines in the number of children raised on farms have shrunk the pool of potential young farm entrants. The pool of potential farm entrants is expected to continue shrinking. The number of 20-29 year olds raised on farms will fall from 671,000 in 1990 to 375,000 in the year 2000.

The average age of U.S. farm operators was 52 years in 1987, up from 51.7 in 1974 and 51.3 in 1964. In 1987, 45 percent of U.S. farm operators were at least 55 years old, while 13 percent were under age 35. About half of the Nation's 279,000 farmers under age 35 are located in three regions: Lake States, Corn Belt, and Northern Plains.

The Decline Will Be Slow

The annual decline in farm numbers between 1992 and 2002 is projected at an average 1.3 percent. The projected 1.7 million farms in 2002 is higher than earlier projections based on 1969-74 data, but lower than a projection based on 1974-78 data. The fastest declines are predicted for the Appalachian, Delta, and Southeast regions, while less change is expected in the Mountain, Pacific, and New England regions. The average age of farmers is expected to continue rising through the 1990's.

The complex workings of land and credit markets will determine how retiring farmers' assets are transferred to the next generation. Existing and entering farmers will increase the size of their operations by acquiring the land and assets of retiring farmers. About 44 percent of land owned by farm operators under age 35 was obtained by purchase from family members, through inheritance, or as a gift. Most young farmers enter farming successfully by renting most of the land they farm.

A number of State and Federal government intiatives have assisted beginning farmers, but the impact of these programs has been small. Commodity programs often benefit established farmers, and do little to aid new farmers. Prospective taxes on nominal capital gains, combined with tax code provisions that reduce estate taxes on farm property, encourage aging farmers to hold land until death. These provisions facilitate intergenerational transfer of family farms, but may restrict the supply of farmland available on the open market.

As farms become fewer and larger, arrangements for managing and financing farms are gradually evolving. U.S. farmers are renting a larger share of their land. The degree of vertical integration is increasing, as farms contract with processors and input suppliers. Land rental and contracting arrangements may improve opportunities for farm entry by persons with low equity levels.

The New Generation of American Farmers: Farm Entry and Exit Prospects for the 1990's

Fred Gale

Introduction

Rapid changes in farm technology, marketing, and management practices over the past four decades mean that today's young farmers are entering an industry vastly different from the farming industry their elders entered 40 years ago. Today's commercial farms are more specialized and capital-intensive, and operate on a larger scale than the typical farm of 30 or 40 years ago. Over the coming decade, the older generation of relatively numerous post-World War II farm entrants will gradually leave farming through retirement, scaling down of operations, and death. They will be replaced by a smaller number of new farmers who will likely alter the face and character of farming in the United States. The process through which younger farmers enter and expand their holdings to replace retiring farmers is not well understood. This process plays an important role in bringing about changes in farm structure, and is fundamental to understanding recent trends toward increasing average age of farmers and declining entry of young farmers. These trends arouse concern among policymakers and farm advocates about the future structure of farming in the United States.

This report outlines some of the demographic trends in U.S. farming today, and assesses their importance for shaping the farm sector as we move into the next century. The report begins by showing how changes in age-specific rates of exit and entry produced rapid declines in farm numbers during the 1950's and 1960's, stabilization of farm numbers during the 1970's, and further declines in the 1980's. Patterns of entry, exit, and land turnover by age group are examined for six selected States. The report discusses prospects for farm entry during the 1990's and presents projections of entry, exit, and farm numbers through the decade. A comparison of today's young farmers with young farmers of the 1960's and with today's older farmers illustrates the greater productivity of today's farmers, and suggests that if the demand for farm products remains stable, fewer farmers will be needed to maintain an adequate supply of food and fiber. Also, I looked at how young farmers acquire land and other farm assets to examine prospects for transferring assets of retiring farmers to new entrants and young farmers expanding their operations. Finally, the effects of various government policies and programs on farm entry are discussed.

How Farm Entry and Exit Are Related to Farmer Age

In this section, I examine how age-specific patterns of entry and exit affect the distribution of farmers by age, and how economic conditions influenced entry and exit during the 1980's.

Analysis of census of agriculture data shows how demographic patterns of farm entry and exit influenced changes in farm numbers. An aging farm population is a result of low farm entry by young persons. Aging farmers are not a new concern, and an imbalance between the number of old and young farmers is common to industrialized nations. Census of population data suggest that the number of farm children, the traditional source of potential farm entrants, may continue shrinking over the coming decade. This suggests that the number of farm entrants will continue to be low. The shrinking pool of potential entrants cannot explain all of the decline in farm entry during the 1980's. Finally, analysis of longitudinal farm data show how entry, exit, and land accumulation differ across age groups and regions.

The Rapid Decline in Farm Numbers of the 1950's and 1960's

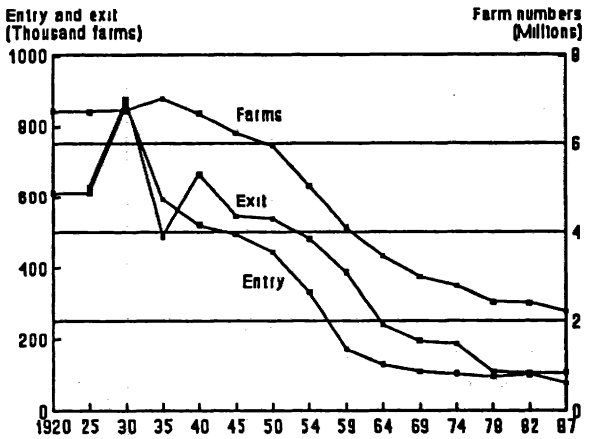
As a nation develops from an agricultural to an industrial economy, labor is drawn out of the agricultural sector to satisfy the increased demand for labor in manufacturing and other growing sectors. Prospects of higher earnings in nonfarm jobs drew U.S. workers out of farming in unprecedented numbers during the 1940's and 1950's, when farm numbers fell by more than 100,000 per year.

The decline in farm numbers of the 1950's and 1960's is often attributed to high rates of exit from farming, but an examination of historical census of agriculture data shows that declining entry also played a role. I estimated the number of farm entrants using census tabulations of farms by "years on present farm." These tabulations were available in most censuses of agriculture from 1920 to 1987. When censuses were spaced 5 years apart, I assumed that farmers reporting 5 or fewer years on their present farm had entered since the previous census. This is a fairly reasonable assumption for recent decades, but this assumption is less useful during the 1920's and 1930's, when about 40 percent of U.S. farmers were tenants. At that time, movement of farm families from one farm to another was more common, and many farmers had to start over on a different farm after losing their farms to bankruptcy during the agricultural depression of the 1920's. With this estimate of entries and the change in farm numbers between censuses, I then derived an estimate of exits between census years. Figure 1 shows estimated number of farm entries and exits per year based on censuses of agriculture from 1920 to 1987.[1]

Both entry and exit were at high levels, but nearly equal to one another in the late 1920's, indicating numerous movements of farm families from one farm to another, but stability in total farm numbers. Farm entry declined slowly in the late 1930's and 1940's, as the number of farms also began declining. During the 1950's, entry fell rapidly from about 450,000 per year to less than 200,000. Over the same period, exits fell more slowly, from about 550,000 to 400,000 per year. Thus, a wide gap between exit and entry resulted, and farm numbers declined as much as 200,000 per year during this period. Entries gradually stabilized in the late 1960's and 1970's. By the late 1970's, the decline in farm numbers slowed, as farm exits nearly equaled entries.

Changing age patterns of entry and exit also influenced changes in farm numbers over this period. Historical gross entry and exit rates could not be computed by age group, but I estimated net entry and exit rates (the difference between gross entry and gross exit) by age between census years from 1950 to 1987 using cohort analysis (described in the appendix). The results are shown in table 1. During the 1950's and 1960's, more than 500,000 farm operators ages 55 and older were exiting between censuses (usually spaced 5 years apart). Net exit of 35- to 54-year-old farmers more than offset the net entry of farmers under 35 years old. The result was rapid decline in farm numbers roughly equal to the loss of older farmers through attrition. Net entry of under-35-year-old farmers displays no apparent trend after 1950. This appears to conflict with the declining trend in gross entry during the 1950's (fig. 1). However, note that figure 1 shows that gross exits were also declining along with gross entry. Parallel decline in gross exit and gross entry of under-35-year-old farmers could have produced the fairly constant level of net entry for young farmers over the period.

Figure 1
Estimated entry and exit, and number of U.S. farms, 1920-87
Lower entry led the way in reducing farm numbers through the 1950's and 1960's.



Source: Estimated from censuses of agriculture.

[1]An adjustment for nonreporting was also used, because many census respondents did not report years on present farm. When censuses were 4 years apart, the method was adjusted accordingly. See Gale and Henderson for a more detailed description of the method.

In the mid-1970's, the decline in farm numbers slowed. Net entry of under-35-year-old farmers increased to 217,000 between 1974 and 1978 before falling to 168,000 between 1978 and 1982. At the same time, large net exits of 35-54 year olds were transformed to net entries from 1974 to 1982, as off-farm migration slowed and entries in this age group increased. The attrition of farmers aged 55 and older slowed steadily from more than 100,000 per year in the 1950's and 1960's to about 65,000 per year during 1978-82. This slowed the decline in total farm numbers. Between 1982 and 1987, the decline was more rapid (although much slower than in earlier decades) as net entry of young farmers dropped and attrition of older farmers continued, albeit at a slower pace of less than 50,000 per year.

Exit and Entry in the Boom and Bust of the 1970's and 1980's

Decline in farm numbers slowed considerably over the past two decades. As the influence of long-term structural adjustment has receded, the impacts of short-term economic conditions on farm entry and exit have been more noticeable. The experience of the late 1970's and 1980's shows how entry and exit fluctuate in response to the economic environment. This section looks more closely at gross rates of entry and exit from 1978 to 1987 to illustrate this.

The 1970's were a relatively favorable time for farming. Exports rose to high levels, bolstering demand and prices for farm products. Land values grew rapidly with growing demand for farmland. Many investors saw farmland as a hedge against the rapid inflation of that period, and farmers borrowed to buy land and other assets at low real interest rates. This situation was reversed in the early 1980's, as exports fell, interest rates rose, and land values fell, resulting in considerable financial stress for heavily indebted farmers during the farm financial crisis of the 1980's.

Farm foreclosures and bankruptcy sales were widely reported in the media during the 1980's, focusing public attention on farm exits. The number of farms fell by 300,000 (13 percent) between 1980 and 1990, according to USDA estimates, but the decline in farm numbers during the 1980's was the slowest of any decade since the 1940's (Stam and others). A decline in farm numbers represents the balance of exiting farms against new entrants. Thus, decline can result from decreases in entries as well as increased exits.

Table 1–Estimated changes in net entry and exit of farmers, by age group, 1950-87[1]

Balance between entry of young and exit of older farmers has brought greater stability in farm numbers since 1974.

	Age of operator			
Years	Under 35	35-54	55 and older	Total change
		Thousand farms		
1945-50	616	-331	-760	-475
1950-54	114	-207	-511	-603
1954-59[2]	116	-436	-756	-1,076
1959-64	186	-203	-533	-551
1964-69	197	-123	-502	-428
1969-74[2]	144	-145	-451	-452
1974-78	217	77	-317	-22
1978-82	168	20	-205	-17
1982-87	115	-27	-241	-153

[1]Numbers shown are changes in farm numbers between census years for age cohorts. For example, the difference between the number of under-35-year-old farmers in 1954 and the number of under-40 farmers in 1959 is the net entry of under-35 farmers in the 1954-59 period. Number of farmers by age were obtained from census of agriculture tabulations, which were interpolated using a method described by Matthew Smith in "Entry, Exit, and the Age Distribution of Farm Operators, 1974-82," Journal of Agricultural Economics Research 39(4):2-11 (also see appendix).

[2]Change in the definition of a farm between censuses resulted in fewer small farms being counted. This inflates the net exit numbers for these years.

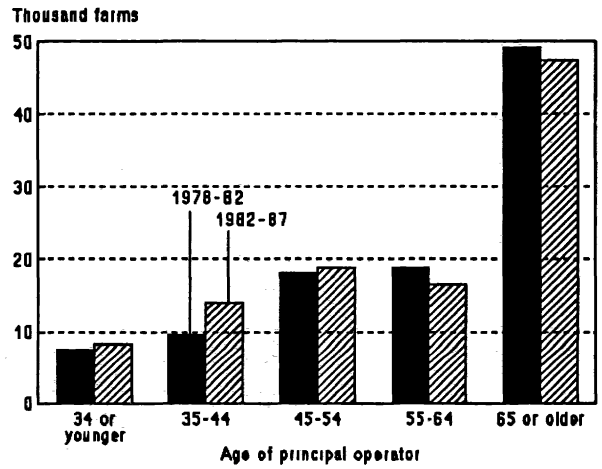
The estimated farm entry and exit numbers by farm operator age are based on tabulations by farmer age group in the 1982 and 1987 censuses of number of years reported on the present farm (the same method used to produce figure 1).[2] Figures 2 and 3 show estimates of farm exits and entries for two time periods, 1978-82 and 1982-87, by age group. The age groups refer to the age of farmers in the final year of each period: 1982 and 1987. For example, the number of entrants who were under 35 years old in 1982 was estimated based on the percentage in that age group who reported 4 or fewer years on their present farm.

Exit tends to be concentrated among the oldest farmers (fig. 2). About 45 percent of exits were by farmers aged 65 or older. Between 1978-82 and 1982-87, the number of exits by older farmers fell slightly, but the percentage of older farmers exiting fell more noticeably, from 8.5 to 7.2 percent per year. The number of farmers aged 65 years and older rose by 77,000 from 1978 to 1987. This is due both to the accumulation of farmers who continued farming to advanced age, and to aging of the large cohort of farmers who entered after World War II but before the sharp decline in entry of the 1950's. The number of 55- to 64-year-old farmers declined by about 55,000 between 1978 and 1987.

The number of exits for other age groups remained stable between the two periods, except for the 35-44 age group, in which the number of exits per year increased about 4,500. The percentage of farms exiting per year rose from 3.5 to 4.5 percent for farms with operators under 35 years old, and from 2.5 to 3.7 percent for farms with operators 35-44 years old. The exit rate was stable at about 3.5 percent for 45-64 year olds. Young farmers were the most vulnerable to the farm financial crisis of the mid-1980's. Many of these farmers entered farming at the peak of the land price boom, and many bought farmland before prices plummeted. Young farmers also tend to have higher debt-to-asset ratios. Young farmers under age 45 increased in number between 1978 and 1982, but decreased between 1982 and 1987. Farmers between ages 45 and 64 declined by about 150,000 from 1978 to 1987.

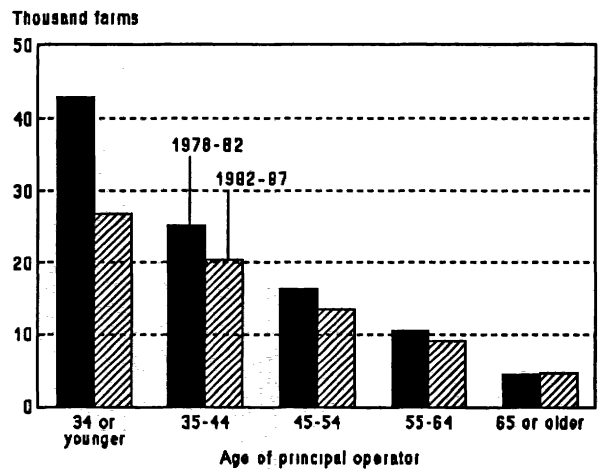
[2]Estimation of exits was more complex, because the change in farm numbers between census years by age group cannot be directly observed. The net change in number of farmers in the age cohort between 1978 and 1982 was estimated by interpolating the 1978 published age distributions to obtain the number of farmers under 31, 31-40, 41-50, 51-60, and 61 and older. The interpolation method used Karup-King interpolation coefficients described in the appendix (Shryrock and Associates). Then, given the net change and estimated entry to the cohort, exits were estimated. For example, if there were 15,000 new entrants out of a total of 30,000 farmers under age 35 in 1982, and there were 20,000 farmers under age 31 in 1978, it can be inferred that 5,000 farmers exited from this age cohort between 1978 and 1982. The same method was used for the 1982-87 period, except that the age groups interpolated for 1982 were under 30, 30-39, 40-49, 50-59, and 60 and older, because the 1982 and 1987 censuses were 5 years apart.

Figure 2
Estimated farm exits, by age of operator, 1978-87
Exits are concentrated among the oldest farmers.



Source: Estimated from Census of Agriculture.

Figure 3
New farm entrants, by age of operator, 1978-87
Entry of young farmers declined substantially during the farm crisis of the mid-1980's.



Source: Estimated from Census of Agriculture.

The more noticeable change is a decrease in entry among the two youngest age groups (fig. 3). During 1978-82, about 45 percent of entries were in the under-35 age group, but the percentage fell to about 33 percent during 1982-87. Between the two periods, the number of entries per year fell by 15,000 (35 percent) in the under-35 group, and by 5,000 (20 percent) in the 35-44 age group. Overall, entries fell from about 99,000 per year during 1978-82 to 75,000 during 1982-87, while exits rose from 103,000 to 105,000. In terms of causing decline in farm numbers, the most important impact was decline in entries, not increase in exits.

These patterns suggest some obvious questions. Did young people simply postpone entry until the farm economy recovered? Why did the exit rate for older farmers decrease during 1982-87? Did older farmers postpone retirement until land prices recovered? No data on entry or exit are available for more recent years. Answers to these questions may have to wait until 1992 census data are available.

The most recent information on farm numbers is USDA's annual estimate of the total number of farms, based on annual sample surveys. These data show farm numbers declining at a slower rate of about 25,000 per year from 1987 to 1994, as compared with 39,000 per year from 1982 to 1987 (table 2). If gross exits continued at the same rate of about 105,000 per year, a gross entry rate of 80,000 per year is implied. This would represent an increase in entry of about 5,000 from mid-1980's levels, but 19,000 below 1978-82 entries.

Increasing Average Age of Farmers

Recent increases in the average age of farmers have caused some concern about the future of American farming. According to the census of agriculture, the average age of principal farm operators rose from 50.3 years in 1978 to 52 in 1987. In 1978, there were 2.6 farm operators aged 55 or older for every operator under age 35. The ratio remained at 2.6 in 1982, and had increased to 3.4 by 1987. Some observers are concerned that the number of young farmers is not adequate to replace retiring farmers.

Census figures, however, may make the Nation's farmers appear older than they really are. The census counts only one operator per farm. When there are two or more operators, the oldest is typically counted as the principal operator. This means that young farmers are likely underrepresented in the census figures, as a number of younger partners typically are not counted. Out of roughly 2 million farms, there are about 200,000 farm partnerships, and 67,000 corporations.[3] Although the census may overstate the age of farmers, this report relies mainly on the census, because it gives the most complete and detailed information about farming in the United States. Keep in mind that the census may miss a number of young farmers and that many of the older farmers counted in the census are largely retired and only work part-time in farming.

Aging farmers are not a new concern. The average age of farmers rose steadily from 46.5 years in 1940 to 51.7 years in 1974, slightly less than the 1987 average of 52. The average age fell between 1974 and 1978 with the influx of young entrants. The sharp decline in entrants in the 1950's left a bulge in the age distribution of farmers. In 1959, a noticeable peak in the age distribution is evident at about age

[3]The Census Bureau's 1987 Current Population Survey (CPS) that measured employment by occupation counted slightly more people employed as farmers or farm managers under age 25 than the number reported by the 1987 census of agriculture. The CPS counts many fewer farmers over age 45 than does the Census, because many census operators are not principally employed in farming. Many older persons who are partially retired and operate small farms with a few acres of land or a modest number of livestock may not be counted in the CPS labor force estimates.

Table 2--Number of U.S. farms, 1982-93[1]

Farm numbers have continued to decline at a modest pace since the farm financial crisis ended.

Year	Farms	Annual change
	Thousands	
1982	2,407	-17[2]
1987	2,213	-39
1988	2,197	-16
1989	2,171	-26
1990	2,140	-31
1991	2,105	-35
1992	2,094	-11
1993	2,065	-29
1994	2,040[3]	-25

[1]Estimates differ from census counts due to adjustment for underenumeration.
[2]Average annual change, 1982-87.
[3]Preliminary.
Source: USDA, Agricultural Statistics.

50, with a smaller bulge at about age 40 (fig. 4). Over the decades, these bulges moved rightward as these cohorts aged, and the distribution of farmers across age groups became more even. Concern about aging farmers was particularly acute in the early 1960's, when the average age of farm operators rose above 51 years, from about 48 in 1950. This was the highest average age recorded until the average reached 52 years in 1987.

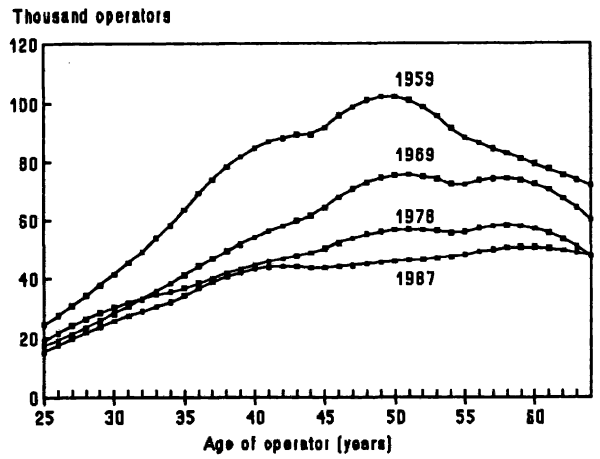
Farmers represented by this bulge in the age distribution have been leaving farming over the past decade or so. Those who were aged 40-50 in 1960 would have been about 70-80 years old in 1990, past normal retirement ages. Those who were at retirement age, say 65, in 1990, would have entered farming about 40 years earlier, in 1950, just before the steep decline in entry began.

Average age of farmers varies across the Nation, due to different structural trends in farming. Areas where farms are largely marginal operations, and where nonfarm career opportunities draw away potential entrants, tend to have older farmers and declining farm numbers. In the western Corn Belt and Northern Plains, average wages are relatively low and there are fewer nonfarm jobs than in the more industrialized Southern or Eastern regions. Full-time farming opportunities are more plentiful in the Northern Plains and Corn Belt; consequently, there are more young farmers and the average age of farmers is lower in those regions. The lowest average ages of farm operators are in the Lake States and Northern Plains. Farm operators tend to be oldest in the South, with average ages over 53 in the Appalachian and Southeast regions and old-young ratios exceeding 4. Average age is also high in the Southern Plains and Mountain regions and California, where very large farms and ranches are common (table 3).

Figure 4

Age distribution of U.S. farm operators, 1959-87

Farmers were more evenly distributed by age in 1987.



Source: Estimated from Census of Agriculture.

The predominance of older farmers is not unique to the United States. Most industrialized nations have a relatively old population of farmers. This pattern is a result of the industrialization process. As a nation's industrial sector develops, younger workers are drawn out of farming, leaving a relatively old farm labor force. The share of farmers aged 55 and older in the United States is comparable to the share in the Netherlands and in Taiwan, a newly industrialized nation (table 4). Canada has slightly younger farmers than the United States, but still more than a third are at least 55 years old, compared with 45 percent in the United States. In Japan, 68.1 percent of persons self-employed in agriculture are at least aged 55.

Shrinking Pool of Potential Entrants

It is unlikely in the near future that entry will return to the levels it reached during 1978-82, for two reasons. First, although the farm economy has recovered from the 1980's crisis, farming is not as attractive as a long-term career or investment option as it appeared to be in the 1970's. Second, there are fewer young people who grew up on farms (the traditional pool of potential entrants), due to shrinking farm birth rates and off-farm migration. The strong entry of the 1970's was partly fueled by the coming of age of the baby boom generation.

Farm entrants tend to be young persons, and most were raised on farms (Leistritz and others; Herr). They are also overwhelmingly white and male. About 85 percent of U.S. farms are owned and managed by a sole proprietor. The "agricultural ladder" pattern, where a farmer begins as a hired worker, then becomes a tenant farmer, and finally an owner-operator, is less common today than in the past, but is still relevant. However, instead of beginning as a hired worker, many persons engaged in a full-time farming career begin working on a family operation before becoming a principal operator. Recent census data show that a large proportion of younger farmers in the Midwest and Plains begin as tenants, moving to part-ownership early in their careers (Gale, 1992; 1994). Full-time

Table 3--Farm operators by age and region, 1987

The youngest farmers are in the Midwest, while the oldest are in the South and West.

Region	Under 35	55 and older	Ratio[1]	Average age
	----------*Thousands*----------			*Years*
New England	3	11	3.9	51.9
Mid-Atlantic	15	50	3.4	51.6
Appalachian	33	141	4.3	53.4
Southeast	13	69	5.2	53.5
Delta	13	50	4.0	52.5
Lake States	35	83	2.4	49.7
Corn Belt	73	193	2.6	50.9
Northern Plains	39	86	2.2	50.1
Southern Plains	26	132	5.1	54.2
Mountain	15	56	3.6	52.0
Pacific	13	69	5.2	53.0
United States	279	943	3.4	52.0

[1]Ratio of farm operators aged 55 and older to farm operators under age 35.
Source: 1987 Census of Agriculture.

farm entry is largely limited to those who were raised on farms, due to the need for considerable human capital that can be acquired through the experience of being raised on a farm. Apparently, farm earnings are not attractive enough compared with prospective nonfarm earnings to induce persons with a nonfarm background to acquire the specific experience and skills needed to operate a successful farm.[4] The potential farm entrant pool is primarily white males. In 1987, about 95 percent of farm operators were males, and about 98 percent were white.

The combination of off-farm migration and declining fertility rates of farm women during the past several decades means that the number of persons raised on farms is shrinking rapidly. Census of population data show that fertility of rural farm women ages 25-34 peaked during the 1950's, when the average was 2.8 children per woman. By 1980, the average was 1.9 per woman. The number of women at peak child-bearing age fell even more dramatically, from 1.38 million in 1950 to 352,000 in 1970, and to less than 300,000 in 1980.

[4]Leistritz and others found that more than 77 percent of North Dakota beginning farmers reported that they grew up on a farm. Fifty-two percent gained farming experience working for a relative, 8.7 percent worked for a neighbor, and 2.3 percent reported other sources of farm experience.

The number of children born on farms also fell dramatically. The decline is illustrated in figure 5, which shows trends in the number of 14- to 19-year-old and 20- to 24-year-old males living on farms from 1965 to 1990. The number of 14-19 year olds has fallen continuously, except for a brief period in the early 1970's when the number stabilized, presaging the strong entry of the mid-to-late 1970's, when the

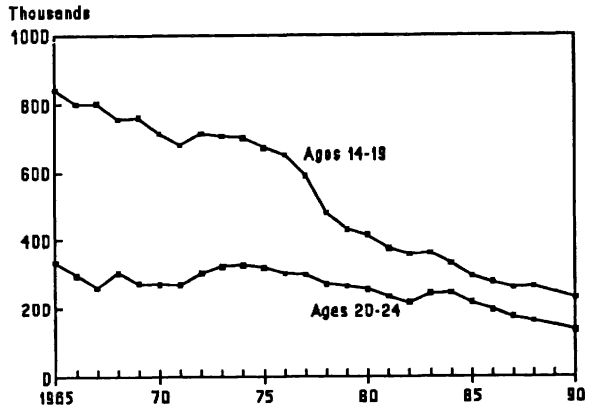
Table 4--Share of old and young farmers, by nation

Industrialized nations tend to have older farmers.

Nation	Year	Farmers aged 55 and older	Farmers under age 35
		---------*Percent*---------	
United States	1987	45.2	13.3
Canada	1986	34.2	19.2
Netherlands	1987	41.1	10.8
Japan	1987	68.1	2.6
Taiwan	1987	48.4	13.4

Sources: Censuses of agriculture: U.S., Canada; Agricultural Statistics Yearbooks: Netherlands, Taiwan; Employment Status Survey: Japan. Data sources are not necessarily comparable. Japan counts self-employed in agriculture. Other statistics are for farm operators.

Figure 5
Number of young males living on farms, 1965-90
The declining number of teenage boys on farms suggests a shrinking pool of potential farm entrants.



Source: U.S. Bureau of Census, Current Population Survey.

members of the "baby boom" cohort attained the age when they were ready to enter farming. A large share of young farm residents leave the farm population at about age 18, as many choose nonfarm occupations. The 20- to 24-year-old farm population therefore reflects the number who have chosen to remain in farming. Since 1965, this age group has declined more slowly, reflecting stabilization of the number of farm entrants over the period. One can conclude that a higher proportion of farm children are remaining in farming. Comparing the number of 20-24 year olds on farms with the number of 14-19 year olds 5 years earlier shows that about 60 percent stayed on farms in recent years, compared with about 33 percent in the early 1960's.

Shrinkage of the pool of potential entrants probably contributed to the decline in entry during the 1980's, but economic factors also contributed. I investigated the role of demographic trends by estimating the number of actual entrants under age 35 and potential entrants of those ages for U.S. regions. I estimated the number of farm entrants younger than 25 and those aged 25-34 years old during the 4-year periods preceding the 1982 and 1987 Censuses of Agriculture by looking at the number of operators reporting less than 5 years operating their current farm in the census tabulations. This is a measure of the number entering as principal operators of a farm operation. This does not count young persons who are working on farms, but who are not principal operators. To estimate the size of the pool of potential entrants in 1982 and 1987, I assumed that the pool of potential entrants of a certain age for a particular State consisted of all white males born on farms in that State in the relevant age group.[5] I measured the number of potential entrants by looking at farm population data in the 1960 and 1970 Censuses of Population. For example, the number of potential entrants aged 25-34 in North Dakota in 1982 was the number of white males on farms in North Dakota ages 3-12 in 1960. This measure assumes that all farm entrants were raised on farms in the State where they began operating their own farms. This measure is less meaningful when there are many entrants who migrated from other States or who have nonfarm backgrounds.

Table 5 reports entry in the 4 years prior to 1982 and 1987 and the number of potential entrants in each of those two periods. The entry rate reported in the table is the ratio of actual entrants to potential entrants. The entry rate is a rough estimate of the proportion of potential entrants who actually entered farming. Nationally, entry of under-25 year olds fell by more than 50 percent between 1982 and 1987, while entry of 25-34 year olds fell by 32 percent. The size of the potential entrant pool of under-25 year olds fell twice as fast as the pool of 25-34 year olds (23 percent vs. 11 percent). For both age groups, the number of actual entrants fell faster than the number of potential entrants. Thus, the estimated percentage of persons in the potential entry pool who actually entered also declined, from 30 to 19 percent for under-25 year olds, and from 42 to 32 percent for 25-34 year olds.

More than half of actual entrants were in three regions: the Corn Belt, Lake States, and Northern Plains. These regions accounted for only about 40 percent of potential entrants, however. The slowest declines in entry were in the Delta region, and the fastest declines were in the Appalachian region. In other regions, the declines ranged between 40 and 55 percent for under-25 year olds and 23-39 percent for 25-34 year olds. Entry declined faster than the pool of potential entrants for most regions and age groups.

In 1987, the entry rate for under-25 year olds ranged from a low of 5 percent in New England to a high of 43 percent in the Northern Plains. Other regions had entry rates between 10 and 25 percent for that age group. The entry rate for 25-34 year olds in

[5]The entrant pool was limited to white males, because very few minorities have entered farming in recent years. The number of female principal farm operators is increasing, but less than 5 percent of young farm operators were women in 1987. A similar method was used in Gale (1993).

Table 5--Entry and potential entrants of farmers under age 35, by region, 1978–87[1]

The number of farm entrants shrank faster than the pool of potential entrants in all regions.

Item	Unit	Region[2]											
		New England	Mid-Atlantic	Appal-achian	Southeast	Delta	Lake States	Corn Belt	Northern Plains	Southern Plains	Mountain	Pacific	United States
Actual entrants:													
Under age 25 years--													
1982	*Farms*	201	1,529	3,817	932	1,115	5,222	9,422	6,030	1,973	1,345	785	32,371
1987	*Farms*	90	848	1,299	464	772	2,342	4,284	3,401	1,134	762	467	15,863
Change	*Percent*	-55	-45	-66	-50	-31	-55	-55	-44	-43	-43	-40	-51
Aged 25-34 years--													
1982	*Farms*	792	3,858	6,209	2,681	2,645	9,107	12,565	7,642	3,943	3,767	3,516	56,724
1987	*Farms*	516	2,876	3,358	1,818	2,201	5,599	8,710	5,188	3,047	2,893	2,597	38,802
Change	*Percent*	-35	-25	-46	-32	-17	-39	-31	-32	-23	-23	-26	-32
Potential entrants:													
Under age 25 years--													
1982	*Persons*	1,951	7,802	14,537	5,455	4,673	15,713	23,949	10,490	13,073	5,303	4,767	107,711
1987	*Persons*	1,770	6,028	11,044	4,165	3,528	11,801	17,979	7,877	11,563	4,015	3,262	83,031
Change	*Percent*	-9	-23	-24	-24	-25	-25	-25	-25	-12	-24	-32	-23
Aged 25-34 years--													
1982	*Persons*	1,918	8,989	19,965	8,101	6,813	19,141	30,010	12,364	15,068	6,690	6,772	135,829
1987	*Persons*	1,877	8,376	16,669	6,475	5,513	17,562	26,965	11,705	13,985	6,150	5,781	121,057
Change	*Percent*	-2	-7	-17	-20	-19	-8	-10	-5	-7	-8	-15	-11
Entry rate:													
Under age 25 years--													
1982	*Percent*	10	20	26	17	24	33	39	57	15	25	16	30
1987	*Percent*	5	14	12	11	22	20	24	43	10	19	14	19
Aged 25-34 years--													
1982	*Percent*	41	43	31	33	39	48	42	62	26	56	52	42
1987	*Percent*	27	34	20	28	40	32	32	44	22	47	45	32

[1]Actual entrants: Estimated number of farmers reporting less than 5 years on present farm in census year; Potential entrants: Number of white male children born on farms who attained the relevant age in 1982 or 1987; Entry rate: Ratio of actual entrants to potential entrants.

[2]Regions: New England–ME,NH,VT,MA,CT,RI; Mid-Atlantic–NY,PA,NJ,DE,MD; Appalachian–WV,VA,NC,KY,TN; Southeast–SC,GA,FL,AL; Delta–LA,MS,AR; Lake States–MI,WI,MN; Corn Belt–OH, IN,IL,IN,MO; Northern Plains–ND,SD,NE,KS; Southern Plains–OK,TX; Mountain–MT,WY,UT,NV,NM,AZ; Pacific–CA,OR,WA.

1987 ranged from 20 percent in the Appalachian region to 44-47 percent in the Northern Plains, Pacific, and Mountain regions. In the Corn Belt and Lake States, the entry rate for 25-34 year olds was 32 percent.

These data suggest that the shrinking pool of potential entrants played a role in reducing the number of entrants, but economic factors also probably played a role because the rate of entry fell. The greater decline in entry of under-25 year olds may have occurred because the size of the potential entrant pool was shrinking more rapidly. The faster shrinkage of that pool also suggests that the 25- to 34-year-old potential entrant pool, the most common age for farm entry, will continue to shrink in the 1990's.

The number of potential entrants should continue shrinking in the 1990's. According to census of population data, more than 1.4 million males were born on farms during the 1950's. During the 1960's, about 671,000 males were born on farms, and in the 1970's, about 375,000 males were born on farms. Consequently, the number of 20-29 year olds who spent their early years on farms should shrink 32 percent between 1990 and 1995 and 17 percent between 1995 and the year 2000 (table 6).

The shrinking pool of potential entrants is probably most relevant for the Corn Belt, Lake States, and Northern Plains, where traditional farming career patterns appear to be strongest. In many other parts of the country, entrants are increasingly older persons, part-time farmers, persons with nonfarm backgrounds, and others who do not fit the traditional profile of a family farmer. For example, entry patterns in the Corn Belt state of Illinois and the Northern Plains state of North Dakota tend to follow well-defined age patterns. These patterns are less clear in California and Texas, where entrants and exits are more equally distributed across age groups. The pool of potential entrants may have a much different composition outside the Midwest, and the pool as I have defined it here may be less meaningful. If farm returns are attractive enough to entice nontraditional farm entrants, the pool of potential entrants would become less important as a determinant of the supply of entering farmers.

Table 6--Number of potential farm entrants, 1980-2000

The pool should shrink considerably over the coming decade

Year	20-29 year olds raised on farms[1]
	Thousands
1980	1,443
1985	917
1990	671
1995	454
2000	375

[1]Estimates based on number of children on farms in 1960, 1970, and 1980 Censuses of Population.

Age Patterns of Entry, Exit, and Land Accumulation in Selected States, 1982-87

Some observers have concluded that the large number of older farmers near retirement age means that farm numbers will decline rapidly in coming years. In this section, matched census information from 1982 and 1987 details entry and exit patterns by operator age for six States representing various regions of the Nation. The data show how age-specific entry and exit patterns brought about changes in farm numbers. We also can observe how changes in farmland ownership and control result from entry, exit, growth, and decline of farms. This provides some insight into the effects of age-specific patterns of entry and exit on aspects of farm structure, including average farm size and concentration of landownership. This analysis provides more detail to complement the analysis of farm numbers in earlier sections and the cohort analysis discussed later in this report.

A longitudinal data file (LDF) created by the Census Bureau was used for this analysis. The LDF was created by matching farm records from the 1978, 1982, and 1987 Censuses of Agriculture. This file has basic information for each farm enumerated in those years. If a farm was not enumerated in a particular year, the information corresponding to that year is missing. I assumed that if a farm had information in one year and none in a subsequent year, it exited. For example, if a farm reported for 1982, but not for 1987, I assumed that the farm exited during that period. Similarly, if no information was reported for 1982, but does appear for 1987, I assumed that the farm entered between 1982 and 1987. The data were available for all States, but the huge size of the LDF made processing the entire file infeasible. I chose to analyze data covering the 1982-87 period from six States representing various

regions of the country: California, Illinois, New York, North Carolina, North Dakota, and Texas.

Tables 7-12 show farm numbers, exits, and entries along with corresponding land in farms by 5-year age groups of operators ranging from under 25 years old to aged 80 years and older for each of the six States. The numbers in each row correspond to the age of cohort members in 1982. My intent is to look at each age group in 1982 and observe what happened to the members of that group over the 1982-87 period. For example, of the 2,558 California farmers who were 25-29 years old in 1982, 1,259 had exited by 1987 (49 percent) and 1,299 remained in 1987. Those classified as exits may have stopped farming, died, or failed to respond to the census in 1987, or the farm may have been assigned a different Census File Number in 1987 so that records from the 2 years did not match. This tends to overestimate exits and entrants.

I assumed that the farmers who were counted in the 25- to 29-year-old age group in 1982 were counted in the 30- to 34-year-old age group in 1987. The 25- to 29-year-old group contained 2,558 farmers in 1982. Five years later, in 1987, the 30- to 34-year-old group contained 4,464 farmers, an increase of 1,906 for that age cohort. The data show that 49 percent, or 1,259, of the 1982 25-29 year olds exited by 1987, leaving 1,299 survivors, who were assumed to move into the 30-34 age group in 1987. Thus, of the 4,464 30- to 34-year-old farmers in 1987, we conclude that 1,299 were survivors from 1982 and the remaining 3,165 entered farming between 1982 and 1987. Table 7 shows the 1982 number of farms in column 1, followed by the 1982-87 net change for the age cohort in column 2.[6]

In 1982, the 25-29 year olds in California controlled 615,000 acres of land. This includes all land in farms: cropland, pasture, woodland, etc. Both owned and rented land are included. Of that 615,000 acres, exiters had 235,000, which were replaced by 843,000 acres controlled by new entrants. Members of the cohort who continued in operation increased their holdings by 208,000 acres. The average exiting farm in that cohort had 187 acres and the average entrant had 266 acres; thus, exiting farms were smaller than entering farms.

Net entry/exit rates vary more across age groups than gross entry and exit rates. Significant net entry occurred between 1982 and 1987 for age groups under 35, except in North Carolina, where net exit occurred in the 30-34-year-old age group. Net exit generally occurred for older groups. In most of the six States, the net exit rate jumps about 10 percent between the 55-59 and 60-64 age groups, as farmers reach retirement age. Gross entries generally decline with age, and gross exits are generally concentrated in older age groups. However, entry and exit are more evenly distributed across age groups than net entry/exit rates would suggest.

The clearest age patterns of entry and exit appear in Illinois and North Dakota, where full-time family farms are most common. In these two States, entry is more concentrated in the youngest age groups, exit rates of mid-career farmers are generally lower, and exit rates rise more noticeably between the 55-59 and 60-64-year-old age groups. In the other four States, entrants are less likely to be under age 30, and exits are more evenly spread across age groups. In California and Texas, exit rates are higher for farmers under age 45 than for farmers aged 45-74. In all States, exit rates decline with age until they rise at retirement ages. This is consistent with traditional patterns of job turnover, which tend to be very high for young persons in all occupations who are just beginning their careers.

Retirement rates for farmers tend to be lower than for nonfarm workers. Thus, about one-fifth of principal farm operators are at least 65 years old, while less than 3 percent of all workers in the labor force are aged 65 and older. The net withdrawal rates over 5 years, computed for the entire labor force, are about 35 percent for ages 55-59, 55 percent for ages 60-64 and 60-69, and about 40 percent for ages 70 and older.[7] Net exit rates for farmers in their 50's and 60's are much lower. These percentages, computed from data in tables 7-12, range from 5 to 22 percent for ages 55-59, from 9 to 38 percent for ages 60-64, and from 19 to 38 percent for ages 65-69.

[6]Published census estimates are computed using a weighting factor that adjusts for nonresponse. Between 10 and 15 percent of farms do not respond to the census. I computed farm numbers by age group and corresponding net changes using weighted data. Exit rates (farm numbers and farmland) were computed from unweighted data and multiplied by weighted farm numbers to produce the number of exits shown in the table. Acres of farm growth per continuing farm was computed from unweighted data and multiplied by number of continuing farms (column 1 - column 3). Entries were computed as a residual.

[7]Computed from 1982 and 1987 tabulations of the civilian labor force by 5-year age groups based on Current Population Survey data published by the Bureau of Labor Statistics in Employment and Earnings.

Table 7--California farms, land in farms, and entry and exit, 1982–87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			Components of change:						Components of change:			Land per farm:	
Age in 1982	Farms in 1982	Change, 1982-87	Exits		Entries		Land in 1982	Change, 1982-87	Exits	Entries	Farm growth	Exits	Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	823	1,579	473	58	2,052	249	114	832	51	797	86	107	*388*
25-29	2,558	1,906	1,259	49	3,165	124	615	816	235	843	208	187	266
30-34	5,318	1,853	2,574	48	4,427	83	1,506	1,174	494	883	785	192	199
35-39	7,994	1,448	3,843	48	5,291	66	2,571	437	955	1,320	72	249	250
40-44	9,698	121	4,511	47	4,632	48	4,149	-229	1,933	1,535	170	429	331
45-49	9,341	208	4,087	44	4,295	46	3,379	-134	1,256	1,560	-438	307	363
50-54	10,356	-20	4,252	41	4,232	41	4,379	-960	1,758	1,259	-461	413	298
55-59	11,230	-594	4,531	40	3,937	35	4,450	-614	1,781	1,450	-284	393	368
60-64	10,305	-1,686	4,384	43	4,384	43	4,300	-751	1,569	1,174	-357	358	268
65-69	6,939	-1,301	3,033	44	3,033	44	3,179	-607	1,466	497	362	483	164
70-74	4,059	-1,077	1,816	45	1,816	45	1,922	-868	1,004	324	-189	553	179
75-79	2,159	-739	1,016	47	277	13	848	-277	362	156	-70	357	562
80 and older	1,593	-854	910	57	56	4	732	-281	345	107	-43	379	569
Total	82,373	4,908	36,689	45	41,597	50	32,144	-1,462	13,208	11,905	-158	360	286

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Table 8--Illinois farms, land in farms, and entry and exit, 1982-87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

Age in 1982	(1) Farms in 1982	(2) Change, 1982-87	(3) Components of change: Exits	(4)	(5) Entries	(6)	(7) Land in 1982	(8) Change, 1982-87	(9) Components of change: Exits	(10) Entries	(11) Farm growth	(12) Land per farm: Exits	(13) Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	4,131	3,588	1,710	41	5,298	128	693	1,108	256	851	513	149	161
25-29	6,615	955	2,455	37	3,410	52	1,658	768	518	690	596	211	202
30-34	8,278	418	3,069	37	3,487	42	2,370	707	719	793	633	234	228
35-39	8,894	-137	3,154	35	3,017	34	2,779	369	749	689	430	238	228
40-44	9,696	-724	3,275	34	2,551	26	3,182	135	778	600	313	238	235
45-49	9,955	-679	3,189	32	2,510	25	3,443	75	882	732	225	277	291
50-54	11,472	-1,223	3,546	31	2,323	20	3,803	-73	962	734	154	271	316
55-59	12,765	-1,775	4,251	33	2,476	19	4,240	-459	1,238	816	-37	291	330
60-64	11,675	-4,189	5,227	45	1,038	9	3,515	-1,579	1,527	292	-345	292	282
65-69	7,178	-2,396	3,251	45	855	12	1,627	-629	689	218	-158	212	255
70-74	4,224	-1,669	2,035	48	366	9	798	-308	338	63	-33	166	171
75-79	2,130	-919	1,141	54	22	10	352	-135	172	60	-23	151	273
80 and older	1,376	-853	879	64	26	2	229	-100	132	23	9	150	890
Total	98,389	-9,603	37,182	38	27,579	28	28,689	-122	8,960	6,561	2,277	241	238

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Table 9--New York farms, land in farms, and entry and exit, 1982–87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			Components of change:						Components of change:			Land per farm:	
Age in 1982	Farms in 1982	Change, 1982-87	Exits		Entries		Land in 1982	Change, 1982-87	Exits	Entries	Farm growth	Exits	Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	847	965	429	51	1,394	165	142	202	67	259	10	156	186
25-29	2,000	659	890	45	1,549	77	385	161	147	264	45	165	170
30-34	3,392	500	1,392	41	1,892	56	690	117	232	322	27	167	170
35-39	4,442	79	1,753	39	1,832	41	922	101	296	359	38	169	196
40-44	4,933	-460	1,993	40	1,533	31	1,092	-63	334	259	12	168	169
45-49	4,723	-334	1,733	37	1,399	30	1,114	-45	328	256	27	189	183
50-54	5,307	-756	2,034	38	1,278	24	1,286	-138	392	252	2	193	197
55-59	5,287	-978	2,106	40	1,128	21	1,292	-267	437	213	-42	208	188
60-64	4,680	-1,450	2,069	44	619	13	1,083	-345	417	105	-33	201	169
65-69	3,118	-1,058	1,474	47	416	13	606	-224	255	74	-43	173	177
70-74	1,906	-739	978	51	239	13	320	-123	142	35	-15	146	145
75-79	980	-510	584	60	74	8	157	-83	80	0	-3	137	0
80 and older	634	-424	465	73	41	6	104	-76	58	0	-17	125	0
Total	42,249	-4,506	17,900	42	13,395	32	9,193	-782	3,185	2,398	8	178	179

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Table 10--North Carolina farms, land in farms, and entry and exit, 1982-87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

Age in 1982	(1) Farms in 1982	(2) Change, 1982-87	(3) Components of change: Exits	(4)	(5) Entries	(6)	(7) Land in 1982	(8) Change, 1982-87	(9) Components of change: Exits	(10) Entries	(11) Farm growth	(12) Land per farm: Exits	(13) Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	1,633	974	903	55	1,877	115	137	189	69	167	91	77	89
25-29	3,322	392	1,625	49	2,017	61	378	191	152	208	135	93	103
30-34	5,255	-213	2,474	47	2,261	43	737	83	297	215	165	120	95
35-39	6,352	-281	2,827	45	2,546	40	932	124	334	248	210	118	97
40-44	7,106	-951	3,067	43	2,116	30	1,095	7	338	164	181	110	77
45-49	7,486	-698	3,098	41	2,400	32	1,151	43	389	322	110	126	134
50-54	8,784	-1,381	3,487	40	2,106	24	1,398	-93	447	263	91	128	125
55-59	9,610	-2,118	3,990	42	1,872	19	1,502	-283	549	243	23	138	130
60-64	8,879	-2,795	4,112	46	1,317	15	1,341	-499	592	181	-87	144	137
65-69	6,408	-2,367	3,136	49	769	12	778	-238	338	128	-28	108	167
70-74	4,357	-1,943	2,336	54	393	9	462	-170	218	56	-7	93	141
75-79	2,164	-1,180	1,275	59	95	4	242	-123	131	19	-11	103	197
80 and older	1,426	-687	842	59	155	11	171	-107	105	15	-18	125	70
Total	72,782	-13,248	33,172	46	19,924	27	10,324	-876	3,959	2,229	855	119	112

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Table 11--North Dakota farms, land in farms, and entry and exit, 1982–87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			Components of change:						Components of change:			Land per farm:	
Age in 1982	Farms in 1982	Change, 1982-87	Exits		Entries		Land in 1982	Change, 1982-87	Exits	Entries	Farm growth	Exits	Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	1,974	1,882	753	38	2,635	133	1,230	1,807	426	1,532	701	565	581
25-29	3,236	615	1,102	34	1,717	53	2,688	1,285	840	1,325	800	762	772
30-34	3,607	378	1,176	33	1,554	43	3,621	1,419	1,011	1,753	678	860	1,128
35-39	3,468	90	1,035	30	1,125	32	4,290	496	1,039	1,143	392	1,003	1,016
40-44	3,297	-145	993	30	848	26	4,280	-42	1,072	775	254	1,080	914
45-49	3,561	-75	1,026	29	951	27	5,192	-110	1,362	1,101	151	1,328	1,157
50-54	4,296	-148	1,138	26	990	23	5,320	-242	1,251	938	72	1,099	947
55-59	4,640	-596	1,494	32	898	19	5,302	-714	1,558	1,098	-254	1,043	1,222
60-64	3,952	-1515	1,859	47	344	9	4,133	-1886	1,711	264	-439	920	768
65-69	2,231	-634	1,020	46	386	17	1,947	-568	774	293	-87	759	758
70-74	1,278	-50	623	49	123	10	1,111	-498	493	116	-121	791	944
75-79	601	-308	308	51	0	0	819	-621	607	0	-18	1,971	0
80 and older	277	-173	173	62	0	0	217	-72	88	0	16	507	0
Total	36,418	-1,129	12,700	35	11,573	32	40,150	-255	12,232	10,338	2145	963	893

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Table 12--Texas farms, land in farms, and entry and exit, 1982-87, by age[1]

The farmland acquired by younger farmers offsets the decrease in land held by older farmers.

Age in 1982	(1) Farms in 1982	(2) Change, 1982-87	(3) Components of change: Exits	(4)	(5) Entries	(6)	(7) Land in 1982	(8) Change, 1982-87	(9) Components of change: Exits	(10) Entries	(11) Farm growth	(12) Land per farm: Exits	(13) Entries
	Number			*Percent*	*Number*	*Percent*	*1,000 acres*					*Acres*	
Under 25	3,337	4,352	1,689	51	6,041	181	1,292	2,981	512	3,496	-3	303	579
25-29	7,202	3,205	3,237	45	6,442	89	4,247	2,563	1,509	3,510	562	466	545
30-34	11,507	3,037	4,972	43	8,009	70	7,463	2,313	2,777	4,329	762	559	541
35-39	14,888	3,176	6,205	42	9,381	63	9,109	3,025	3,145	5,611	558	507	598
40-44	17,453	1,717	7,092	41	8,809	50	13,015	945	4,297	5,051	191	606	573
45-49	19,067	1,986	7,096	37	9,082	48	12,555	859	3,861	3,663	1058	544	403
50-54	22,860	1,221	7,964	35	9,185	40	17,254	508	5,406	6,305	-391	679	686
55-59	24,542	170	8,130	33	8,300	34	19,324	-1,886	6,305	4,563	-144	775	550
60-64	22,429	-2,122	7,932	35	5,810	26	18,115	-2,767	5,053	2,205	81	637	380
65-69	17,796	-3,689	6,717	38	3,028	17	11,960	-2,879	4,058	2,270	-1,091	604	750
70-74	12,537	-3,845	5,450	43	1,605	13	7,655	-2,011	2,799	1,391	-603	513	866
75-79	6,933	-2,831	3,484	50	653	9	5,364	-2,336	2,186	229	-448	627	458
80 and older	4,407	-2,547	2,547	58	0	0	3,984	-1,952	1,753	0	-199	688	0
Total	184,958	3,830	72,515	39	76,346	41	131,338	-636	43,661	42,623	1,424	602	558

[1]Total farm numbers (1) and land in farms (7) were computed from census of agriculture data, were weighted for nonresponse, and were matched to published totals. Changes in farm numbers and land were computed by assuming that members of each 1982 age group aged 5 years and had moved to the next oldest age group by 1987. Other items in the table were computed from unweighted longitudinal data created by matching census records. Estimated exit and entry rates were multiplied by weighted farm numbers and land in farms.

Source: Longitudinal Data File, created from census of agriculture by U.S. Dept. Comm., Census Bureau.

Little is known about farmer retirement patterns. Farmer retirement is a complex process. Farmers are generally self-employed and own substantial assets related to the farm business. The farm not only provides employment and an income, but is also usually a place of residence. Many aging farmers gradually scale back their operations, as net decreases in land for older continuing farmers show (tables 7-12). Many older farmers gradually transfer ownership and control of farm assets to a younger family member or business partner. Older farmers often continue to live on a small farm that may earn little income (perhaps allowing the farmer to pass the earnings test to receive Social Security payments), but still meets the definition of a farm. Almost 60 percent of farm operators aged 65 and older received retirement or disability payments averaging $11,500 in 1988, and nearly 30 percent of 55-64 year olds received an average $9,800 (U.S. Department of Commerce, 1990).

The data in columns (8)-(11) of tables 7-12 indicate the process by which land turns over from exiting and declining farms to entering and expanding ones. According to published census data, five of the six States experienced net loss of farmland between 1982 and 1987; North Dakota posted a slight gain. The net change in farmland has three components: acquisitions by entrants (column 10), less disposals of land by exiting farms (column 9), plus the net accumulation of land by continuing farms (column 11). In each of the six States, the land of exiting farms exceeded the land of entrants. Younger cohorts were net gainers of land, while older cohorts were net losers. The losses of older cohorts were greater than the gains of younger cohorts, and exiting farmers disposed of more land than entering farms acquired. In five of the six States, continuing farms also disposed of more land than they acquired. Only in Texas were continuing farms net gainers of farmland, but this net gain was more than offset by net loss through exit. Hence, there was a net outflow of land from the farm sector.

Table 13 shows net entry rates over 1982-87 for 5-year age groups in these six States. These were computed by dividing the net change in number of farms for each age group found in column 2 of tables 7-12 by the 1982 number of farms in each age group found in column 1. Table 13 shows the percentage increase or decrease in farms for each cohort. The cohort analysis uses net changes like these to project farm numbers in the following section, so it is useful to compare them with the gross changes reported in tables 7-12.

Table 13--Farm net entry rates by age and State, 1982-87[1]

Net entry is positive for younger age groups, and negative for older ages.

Age in 1982	California	Illinois	North Carolina	North Dakota	New York	Texas
			Percent of 1982 cohort			
Under 25	192	87	60	95	114	130
25-29	75	14	12	19	33	45
30-34	35	5	-4	10	15	26
35-39	18	-2	-4	3	2	21
40-44	1	-7	-13	-4	-9	10
45-49	2	-7	-9	-2	-7	10
50-54	0	-11	-16	-3	-14	5
55-59	-5	-14	-22	-13	-18	1
60-64	-16	-36	-31	-38	-31	-9
65-69	-19	-33	-37	-28	-34	-21
70-74	-27	-40	-45	-39	-39	-31
75-79	-34	-43	-55	-52	-52	-41
80 and older	-54	-62	-48	-67	-67	-58

[1]Numbers are 1982-87 change in number of farmers as a percentage of farmers in each 1982 age group. Computations assume that farmers had moved to the next highest 5-year age group by 1987. Positive numbers reflect net entry; negative numbers reflect net exit.

The net changes show a clearer age pattern than do the gross changes, and there are noticeable differences between States. The youngest age group experienced net entry in each of the six States, ranging from 192 percent in California to 60 percent in North Carolina. Negative net entry (net exit) begins with the 30-34 year olds in North Carolina, the 35-39 year olds in Illinois, and the 40-44 year olds in North Dakota and New York. Net exit does not appear until the 55- to 59-year-old group in California and the 60- to 64-year-old group in Texas. Net exit at ages 60-64 ranges between 30 and 40 percent in Illinois, North Carolina, New York, and North Dakota, but is only 16 percent in California and 9 percent in Texas.

Comparing table 13 with tables 7-12 shows that low net exit rates of older farmers in California and Texas are due mainly to high entry of older farmers. For example, table 7 shows an exit rate of 43 percent for 60- to 64-year-old farmers in California, just a few percentage points lower than the 45-percent rate for Illinois. However, the entry rate for 60- to 64-year-olds in California was 26 percent, compared with 9 percent for Illinois. Net exit rates increase with age, but as we have seen, many farmers continue farming until advanced age. At ages 80 and older, net exit rates range from 48 percent in North Carolina to 67 percent in New York.

Projected Farm Numbers

The preceding data have described the process through which farmers of different age groups enter and exit farming, and acquire and dispose of farmland. This information shows how patterns of gross entry and exit produce net entry/exit rates. Net entry/exit rates will be used to project farm numbers. Understanding how farmland is accumulated and passed from exiting to entering farmers is also important to the discussion of the evolution of farm structure.

This section presents demographic farm number projections for 1992 to 2002. The projections are produced by using net exit and entry rates by farm operator age group from two periods: 1978-82 and 1982-87. The projections suggest a moderate decline in farm numbers. The decline will be much slower than predicted in the widely cited study by the Office of Technology Assessment, but faster than predicted by Edwards, Smith, and Peterson. Regional differences are also shown.

Some observers of the farm sector have concluded that the high average age and large number of older farmers will mean substantial declines in farm numbers and reshuffling of farm assets in the coming decade. To assess prospects for this, I projected farm numbers based on the current age distribution and historical net entry and exit rates by age group. The method is a modified cohort analysis, which assumes that recent age-specific entry and exit rates will continue (for a discussion of cohort methodology, see appendix). Basically, this analysis attempts to answer the question, "Given the current age structure of farmers, and if entry and exit rates follow recent patterns, what will happen to farm numbers and average age of farmers over the coming decade?" I also compare these projections with earlier projections of farm numbers.

A serious pitfall in projecting farm numbers is that the parameters of projection models change over time. Table 14 shows net entry and exit rates by age groups from the 1945-50 period to 1982-87. These are comparable to the figures in table 13 in the previous section. Net entry/exit rates have fluctuated considerably over time. Net exit rates for farmers aged 35 and older were lower in 1987 than before 1974. Entry of farmers under age 45 has slowed since the 1970's. Some earlier analysts projected declines in farm numbers based on pre-1974 trends that proved to be much more rapid than actual trends in the late 1970's and 1980's.

As observed earlier, net entry/exit rates changed abruptly during the 1970's. It is unlikely that the high pre-1974 net exit rates for 35- to 54-year-old farmers will be observed again in the future, because the gap between farm and nonfarm earnings that was so wide in the 1950's and 1960's has disappeared in recent years (Ahearn and others, p. 10; Reimund and Gale, p. 17). Little previous research has examined farmer retirement rates, so it is difficult to speculate on whether net exit rates of older farmers will rise again to earlier levels. Labor-saving machinery and improved health have probably contributed to lower retirement rates of farmers.

Net entry/exit rates will be somewhere between the high net entry of 1974-82 and the low net entry of 1982-87. Entry rates of young farmers in the 1990's are unlikely to be as high as they were during 1974-82; it is not clear whether they will be as low as during 1982-87. Exit rates of older farmers were more stable during 1978-87. Three sets of net entry/exit rates were used to produce alternative

Table 14--Net entry/exit rates, by age, 1950-87[1]

Net entry and exit rates have fluctuated over time.

Years	Age group in initial year					
	Under 25	25-34	35-44	45-54	55-59	60 and older
			Percent			
1945-50	255.4	27.4	-3.8	-14.4	-19.4	-44.5
1950-54	61.7	0.7	-6.4	-10.2	-16.5	-33.5
1954-59[2]	136.5	-1.7	-16.3	-21.5	-24.7	-50.3
1959-64	173.8	19.0	-4.2	-17.1	-17.7	-45.5
1964-69	201.5	29.1	-2.1	-12.9	-14.1	-49.7
1969-74[2]	184.5	17.0	-4.8	-16.8	-22.9	-46.5
1974-78	201.1	46.6	21.9	-1.7	-9.6	-42.6
1978-82	134.3	27.4	9.6	-3.9	-6.4	-30.1
1982-87	114.5	14.7	-0.6	-4.9	-10.0	-32.3

[1]Net exit/entry rates are (M_j/N_j)-1, where N_j and M_j are numbers of farmers in birth-year cohort j, in years t and t+k. Positive numbers indicate net increase in farm numbers; negative numbers indicate net decrease.

[2]Change in the farm definition resulted in fewer small farms being counted between these years, increasing the apparent number of exits.

projections from 1992 to 2002: the rates from 1978-82, 1982-87, and an "average" of the two periods.

Net exits differ relatively little using the rates from the different periods; larger differences in entry result in differing projections. Figure 6 shows a "high" projection corresponding to 1978-82 rates, a "low" projection corresponding to 1982-87 rates, and an "average" projection, which uses an average of net entry rates from the two periods. For comparison, earlier projections of farm numbers by Edwards and others and by Office of Technology Assessment (OTA) are also shown.

The high projection from the cohort analysis is 1.92 million farms in 2002, the low projection is 1.54 million, and the average is 1.73 million. The average decline projected is about 26,600 farms per year between 1992 and 2002, or about 1.3 percent per year. Comparing the projection for 1992 with actual total farm numbers between 1987 and 1992 indicates that the average projection is consistent with the actual decline in farm numbers over that period. However, the high projections show a slower decline and the low projections a faster decline than actually occurred.[8] These projections assume that the current definition of a farm is maintained (any place producing and selling at least $1,000 of agricultural products annually). The projection based on 1978-82 rates shows a decline parallel to the historical decline of the 1978-82 period, and the projection based on 1982-87 shows continuation of the decline from the 1982-87 period. Each projection shows a much slower decline than that of the pre-1974 years.

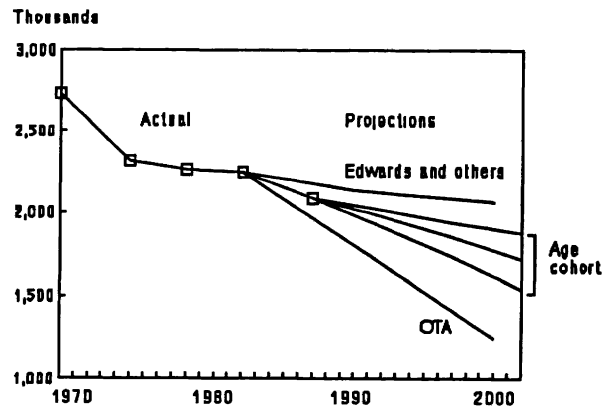
The projections are much higher than projections based on data from the 1960's and 1970's. A widely cited study by the Office of Technology Assessment based on data from 1969-82 projected there would be 1.25 million farms in the year 2000. The study by Edwards and others, based on trends from the high entry years of 1974-78, projects a higher number of about 2.1 million farms in the year 2000. An annual net decline of about 60,000 farms would be needed to reach 1.25 million farms by 2000, about double the decline during the 1980's farm crisis. The attainment of 2.1 million would require no change in farm numbers. Lin and others adjusted census numbers for underenumeration, thus their numbers are not comparable to unadjusted census numbers used here, but their projected decline of about 42,000 farms per year from 1974 to 2000 is much more rapid than the age cohort projection. In light of recent trends, these earlier projections seem improbable, but there is no guarantee that recent trends will continue. New changes in the economic

[8]1992 Census data were not available when this research was conducted. As this report was being prepared for publication, 1992 data were being released. Actual 1987-92 changes in farm numbers appeared consistent with this study's projections.

Figure 6

Projected farm numbers to year 2002

A modest decline in farm numbers is expected through the 1990's.



Source: Age cohort analysis based on census of agriculture data. Projections from Edwards and others, "The Changing Distribution of farms by Size: A Markov Analysis," Agricultural Economics Research 37(4):1-16; and Office of Technology Assessment, U.S. Congress, 1986, Technology, Public Policy, and the Changing Structure of Agriculture, OTA-F-285.

environment could bring about new trends. Possible changes include trade liberalization, more stringent environmental regulations, a return to the inflationary trends of the 1970's, or changes in tax laws that encourage or discourage investment in farming.

Projections were made for 1992 and 2002 for each of 11 regions of the 48 contiguous States (table 15), based on the average of net entry rates from 1978-82 and 1982-87. If farm entry and exit in the 1990's resemble the patterns observed for 1982-87, the decline in farm numbers could be more rapid than table 15 shows. If the patterns observed during 1978-82 reappear, the decline could be slower. The regions used were the USDA farm production regions, except that the Northeast region was broken into the New England and Mid-Atlantic regions. The "United States" row is the sum of projected farm numbers for each region. The national decline of about 1.3 percent of farms per year projected between 1992 and 2002 would result from the balance of about 258,000 net entries by farmers under age 45 against 523,000 net exits by farmers aged 45 and older, shown in columns 4 and 5. The average age was estimated by multiplying the number of operators in each age class by the age at the midpoint of the age class. The average age is projected to have risen from 52.0 to 52.7 by 1992, then to rise further to 53.9 by 2002.

Farm numbers should continue falling in the Mid-Atlantic, South, Midwest, and Plains while farm numbers should stabilize in New England, Mountain, and Pacific regions. In New England, the small number of farms should be stable, and the average age is expected to rise, probably due to entry of older part-time farmers and low exit rates of older farmers. The Mountain and Pacific regions should experience similar trends. The Northern Plains experienced the strongest entry of young farmers during 1978-87, giving this region the lowest average age (50.0 in 1987), which is expected to rise to 50.3 by 2002 as farm numbers decline by less than 1 percent annually. The Southern Plains has a slow projected decline due to low net exit rates of older farmers. The average age in the Southern Plains is projected to rise to 55.8 by 2002.

The most rapid declines are projected for the South (including the Appalachian, Southeast, and Delta regions), where a substantial deficit should exist between entries and exits. In these regions, net exits of older farmers exceed net entries of younger farmers by a ratio of about 3 to 1. Marginal farming and soil conditions, costly land, and urban expansion generally make farming less attractive in these regions. Nonfarm opportunities in growing, easily accessible cities beckon young people away from farm careers. There are consequently relatively few young full-time farm entrants to replace the numerous older farmers in the South and Mid-Atlantic regions. Increases in small part-time farms around growing Sun Belt cities could offset the trend toward fewer full-time commercial farms, but the total number of farms is expected to fall.

Slower decline in farm numbers is projected for the Corn Belt and Lake States, where the bulk of the Nation's farmers are located. Here net exits of older farmers will exceed net entries of younger farmers by a substantial margin, but by less than in the South. The annual decline should be about 1.5 percent. The average age should rise to 51.2 in the Lake States and 52.3 in the Corn Belt.

These projections suggest that decline in farm numbers will continue as the number of entering farmers fails to keep up with the number of exits. The decline will be modest compared with declines during the 1950's and 1960's, and will be much less than projected by some earlier studies. The trend toward fewer farms will be most rapid in the Corn Belt, Lake States, Southeast, Delta, Plains, and Mid-Atlantic States. Farm numbers are more stable in

Table 15--Number of farms, actual 1987 and projected 1992-2002[1]

Farm numbers will continue declining through the 1990's.

Region	Farm numbers			Expected net entry, aged 44 or younger, 1992-2002	Expected net exits, age 45 or older, 1992-2002	Annual decline in farm numbers, 1992-2002	Average age of farmers		
	1987	1992	2002				1987	1992	2002
	Thousand farms					*Percent*	*Years*		
New England	25	25	25	5	-5	-0.1	51.7	52.4	53.3
Mid-Atlantic	116	110	95	16	-30	-1.4	51.4	52.1	53.0
Appalachian	293	266	218	32	-80	-1.9	53.1	53.7	53.9
Southeast	144	130	103	13	-40	-2.1	53.3	54.2	55.4
Delta	110	99	81	12	-31	-1.9	52.3	52.9	53.3
Lake States	211	196	164	24	-56	-1.6	49.6	50.4	51.2
Corn Belt	450	420	359	51	-112	-1.5	50.7	51.5	52.3
Northern Plains	201	195	183	36	-48	-0.6	50.0	50.3	50.3
Southern Plains	259	254	236	38	-56	-0.7	53.9	54.7	55.8
Mountain	124	125	125	26	-26	0.0	51.9	52.6	53.3
Pacific	149	151	146	24	-29	-0.3	52.8	53.8	55.8
United States[2]	2,087	1,980	1,714	258	-523	-1.3	52.0	52.7	53.9

[1]1987 data are actual values from 1987 Census of Agriculture. 1992 and 2002 data are projections obtained from age-cohort analysis based on entry-exit for 1978-87.

[2]United States totals do not equal sum of regional numbers. Regions do not include Alaska and Hawaii. Projection of United States totals was done separately from regional projections.

the Western regions and New England. The transition to fewer farms will likely operate smoothly as farms consolidate in the Midwest and Plains, and marginal farms in the South and Mid-Atlantic either go out of production or become part-time operations.

This analysis ignores the mechanics of how markets for farm assets will affect retirements and entries. An imbalance between the supply of farm assets being offered on the market by exiting farmers and the demand for those assets from entering farmers and other users could result in price changes. These price changes could in turn affect entry and exit decisions. The demand for farm assets will also depend on prices of farm output, determined by aggregate supply and demand for farm output, and resulting farm earnings. For example, if the number of acres of farmland offered for sale or rent by large numbers of retiring farmers exceeds the demand for farmland by new entrants and expanding farmers, the price of farmland would fall. As the price falls, some farmers may postpone exit and additional buyers may be attracted to the farmland market until supply and demand for farmland are equal.

Fewer, More Productive Farmers

In this section, the characteristics of young farmers in 1987 are compared with characteristics of 1964 farmers to show changes in productivity, capital requirements, and ownership and operating arrangements. While productivity has risen significantly, other characteristics have not changed as drastically. Today's young farmers are also compared with older farmers, who will likely retire in the coming decade, to assess prospects for replacing the output of retirees. These data shed light on how the transition to fewer farms may occur.

How Do Today's Young Farmers Compare With the Previous Generation?

Average farm size of full-time farmers has increased to capture economies of scale and to spread large fixed costs of machinery, equipment, and human capital over larger quantities of output. Labor-saving mechanization also permits operation of small part-time farms by persons with a full-time nonfarm job or by older persons in partial retirement.

Given that demand for food and fiber has not grown rapidly, larger farm sizes on a fairly constant land base imply a decrease in the number of farms. The present farm sector could not accommodate as many farm entrants as it could in the past.

Larger farms also suggest increased capital requirements to enter farming, which could be a barrier to entry for young men and women. Young farmers typically have little equity and often have difficulty obtaining sufficient financing, because they have a short track record in farm management for prospective lenders to evaluate. Is farm entry more difficult today for young persons than it was in the past? A complete answer to this question is very difficult to provide, given current data available. I chose to evaluate this question by comparing the number, amount of resources controlled, and production of young farmers in 1987 with those of 1964.

Table 16 shows characteristics of farms operated by persons under age 35 for 1964 and 1987. These farmers are about a generation apart. Dollar values for 1964 were adjusted for inflation to make them comparable to 1987 dollar values. The general price level, measured by the Consumer Price Index (CPI), rose 266 percent between 1964 and 1987. The Index of Prices Received by Farmers rose slower, at about 150 percent between 1964 and 1987. Farm prices did not keep up with the general level of inflation. The Prices Received Index was used to deflate farm sales, allowing us to use sales to measure the real quantity of agricultural products. The CPI was used to deflate land values and to express land values compared with other goods and services in the economy.

The number of farmers under age 35 was 23 percent smaller in 1987 than in 1964, and the amount of farmland controlled by this age group was 19 percent smaller in 1987.[9] Consequently, average acres per farm was slightly larger in 1987 at 362 acres, compared with 342 acres in 1964. The size distribution of under-35 farmers shows a modest decline in the percentage of farms with 50 to 499 acres and increases in the smallest and largest size classes.

[9]The 1964 Census used a less-restrictive farm definition that counted more small farms. If the 1964 farm definition were used for the 1987 Census, more small farms would have been counted, and the decline in farm numbers would have been smaller.

Despite the smaller number of farms in 1987, the total value of products sold by farmers younger than 35, when adjusted for inflation in farm product prices, was more than 50 percent higher in 1987 than in 1964. Young farmers' inflation-adjusted sales per farm were twice as high in 1987 compared with 1964, and sales per acre of land were 89 percent higher in 1987. Today's young farmers obviously produce a much greater quantity of output for the market than those of a generation earlier. Increased sales per acre reflect improvements in technology and management, and use of chemical inputs.

Land and buildings account for most of the asset value on U.S. farms. The value of farmland and buildings measures the amount of capital controlled by farmers and gives an indication of capital requirements. Capital requirements are commonly believed to have increased due to gains in farm size and rising land prices. When adjusted for inflation in the general price level, the total value of land and buildings controlled by farmers under age 35 was down 6 percent in 1987 compared with in 1964. On a per farm and per acre basis, the real value of land and buildings was 22-23 percent higher in 1987. Farms are larger today and land is more expensive in real terms, but the increases are not as dramatic as commonly perceived. Sales per farm grew even faster than the value of land and buildings per farm. No data on net farm income from 1964 by age were available, but the faster growth of gross income (sales) compared with land and building values suggests that young farmers were producing more output per dollar of assets in 1987.

Value of land and buildings overstates the capital requirement needed to enter farming, because many young farmers rent most or all of their land. In 1964, 40 percent of farmers under age 35 were tenants. By 1987, the proportion had declined to 34 percent. Modest increases in part- and full-ownership rates accompanied this decline in the incidence of tenancy. The incidence of off-farm work also increased modestly between 1964 and 1987.

Young farmers were much more highly educated in 1987 than in 1964. The percentage who did not graduate from high school fell from 37 percent in 1964 to 12 percent in 1987, while the percentage who attended or graduated from college more than doubled. Some have recently expressed concern about declining numbers of minority farmers; this comparison shows that this is no new problem. Only 5 percent of young farmers were nonwhite in 1964, and the percentage was down to 1 percent in 1987.

Table 16--Characteristics of U.S. farms operated by persons under age 35, 1964 and 1987

The young farmers of 1987, though fewer in number, produced more than those of 1964.

Item	Unit	1964	1987	Change, 1964-87
				Percent
Farms	*Thousand*	362	279	-23
Land in farms	*Mil. acres*	124	101	-19
Acres per farm	*Acres*	342	362	6
Total sales[1]--	*Mil. 1987 dollars*	11,307	17,440	54
Per farm[1]	*1987 dollars*	31,201	62,612	101
Per acre[1]	*Do.*	91	173	89
Value of land and buildings[2]--	*Mil. 1987 dollars*	70	66	-6
Per farm[2]	*Thous. 1987 dollars*	194	239	23
Per acre[2]	*1987 dollars*	538	658	22
Tenants	*Percent*	40	34	-6
Part-owners	*Do.*	24	29	5
Full-owners	*Do.*	35	37	2
Worked off-farm	*Percent*	62	68	6
200 days or more	*Do.*	36	43	7
Farms by size:				
1-49 acres	*Percent*	28	31	3
50-99 acres	*Do.*	14	13	-1
100-179 acres	*Do.*	18	15	-3
180-259 acres	*Do.*	12	9	-3
260-499 acres	*Do.*	16	15	-1
500-999 acres	*Do.*	7	10	3
1,000 or more acres	*Do.*	4	7	3
Schooling[3]--				
Not high school graduate	*Percent*	37	12	-25
High school graduate	*Do.*	49	48	-1
Some college	*Do.*	8	27	19
College graduate	*Do.*	6	13	7
Race--				
White	*Percent*	95	99	4

[1]Adjusted for inflation with Index of Prices Received by Farmers.
[2]Adjusted for inflation with Consumer Price Index.
[3]Schooling data in 1987 column is for 1990, source: USDA, 1990 Farm Cost and Returns survey.
Source: Census of Agriculture, 1964 and 1987.

Comparisons of all U.S. farmers for 1964 and 1987 cannot account for the differing trends between regions noted earlier in this report. Table 17 shows comparisons of under-35 year olds for each of the three regions accounting for the largest share of farm entrants: the Lake States, Corn Belt, and Northern Plains. These regions were chosen because most young farm entrants are located there. In terms of number of farms and acres, the comparisons for the Lake States and Corn Belt were similar to the national comparisons, but the Northern Plains showed essentially no change in number of farms and fewer average acres per farm. Total sales by farmers under age 35, adjusted for inflation in farm product prices, rose 79 percent in the Lake States and Northern Plains and 25 percent in the Corn Belt. Per farm sales rose 136 percent in the Lake States, 78 percent in the Northern Plains, and 47 percent in the Corn Belt. Sales per acre of farmland rose in similar fashion.

Overall, value of land and buildings changed surprisingly little between 1964 and 1987. Land and buildings value per farm rose 33 percent in the Lake States, but the increase was very modest in the Corn Belt and Northern Plains. Value per acre rose 13 percent in the Northern Plains and 15 percent in the Lake States, but fell 6 percent in the Corn Belt. Growth in land values per acre was slower in these regions than the national average.

Tenants--farmers who rented all their land--became less common in the Lake States and Northern Plains; yet, a large portion of farmers in those regions were tenants in 1987--43 percent in the Northern Plains and 30 percent in the Lake States. Tenancy increased slightly in the Corn Belt. A form of the "agricultural ladder" strategy for farm entry still persists, where young farmers rent most or all of their land, investing their capital in machinery and livestock.[10] Off-farm work rose the most in the Corn Belt and Northern Plains, but was already high in the Lake States by 1964. More than 60 percent of young farm operators work off-the-farm in all three regions.

It is impossible to determine from these data whether large capital requirements are related to greater off-farm work. Increases over time in off-farm work are likely related to greater accessibility of nonfarm jobs and higher education levels of farm operators.

[10]Leistritz and others reached a similar conclusion in their survey of beginning farmers in North Dakota.

Nonfarm jobs are less plentiful in the Northern Plains than in the Corn Belt, where off-farm work is more common. Crop farms with seasonal labor requirements allow greater participation in off-farm work than do dairy farms, which predominate in the Lake States region.

To more closely examine the changes in productivity of young farmers, I included in table 17 data on production, acreage, and yields for major commodities produced in these regions. Corn, soybeans, and milk are shown for the Lake States, corn and soybeans for the Corn Belt, and wheat for the Northern Plains. Production of each of the commodities shown rose substantially between 1964 and 1987. Acreage devoted to corn rose in the Lake States, soybean acreage rose in the Lake States and Corn Belt, and wheat acreage rose in the Northern Plains. But in each case, production rose much faster than acreage. In the Corn Belt, acres of corn harvested fell 17 percent, but production still rose 36 percent. In the Lake States, the size of the dairy herd controlled by under-35 year olds fell 20 percent, but production rose 23 percent. For each commodity and each region, productivity of fixed assets (land or cows), measured as bushels per acre or milk per cow, rose at least 40 percent. Increased productivity came about through improved plant and animal varieties, use of chemical fertilizer, improved animal health, and improved management practices.

In light of increased productivity, the decrease in the number of farms young persons operated is not surprising. Although the number of young farmers in the United States has declined, the amount of resources that they control has not declined, and the amount they produce has risen substantially. Given the greater production of each individual farm, and the fairly static demand for the food and fiber produced, the market could not absorb the output if the number of farmers remained constant. In fact, despite declining farm numbers, greater productivity has put downward pressure on farm prices. As noted earlier, prices received by farmers rose 144 percent between 1964 and 1987, while the general level of prices rose about 266 percent over the same period.

Can Fewer Young Farmers Replace Those Departing?

How will fewer farms affect the supply of food and fiber? According to the U.S. Department of Agriculture's Farm Costs and Returns Survey, nearly

Table 17--Farm characteristics of operators under age 35, for selected regions, 1964 and 1987

Though fewer in number, the young farmers of 1987 had higher sales than their counterparts of 1964.

Item	Unit	Lake States			Corn Belt			Northern Plains		
		1964	1987	Change	1964	1987	Change	1964	1987	Change
				Percent			*Percent*			*Percent*
Farms	*Number*	46,607	35,453	-24	86,471	73,190	-15	38,707	38,836	0
Land in farms	*1,000 acres*	9,406	8,282	-12	18,162	17,438	-4	26,607	24,344	-9
Acres per farm	*Do.*	202	234	16	210	238	13	687	627	-9
Total sales	*Mil. 1987 dollars*	1,254	2,246	79	3,036	3,787	25	1,371	2,452	79
Per farm	*1987 dollars*	26,906	63,363	136	35,110	51,738	47	35,420	63,146	78
Per acre	*Do.*	133	271	103	167	217	30	52	101	96
Value of land and buildings	*Mil. 1987 dollars*	6,247	6,304	1	18,809	16,935	-10	9,010	9,347	4
Per farm	*1987 dollars*	134,033	177,804	33	217,516	231,388	6	232,776	240,675	3
Per acre	*Do.*	664	761	15	1,036	971	-6	339	384	13
Tenants	*Percent*	44	30	-14[1]	35	38	3[1]	54	43	-11[1]
Part-owners	*Do.*	25	34	9[1]	21	29	8[1]	30	32	2[1]
Full-owners	*Do.*	30	36	6[1]	43	33	-10[1]	15	26	11[1]
Worked off-farm	*Percent*	57	61	4[1]	61	73	12[1]	49	61	12[1]
200 days or more	*Do.*	32	36	4[1]	34	45	11[1]	16	31	15[1]
Corn:										
Production	*1,000 bushels*	84,165	189,073	125	363,862	496,096	36	n/a	n/a	n/a
Acreage harvested	*1,000 acres*	1,316	1,661	26	4,847	4,044	-17	n/a	n/a	n/a
Yield	*Bu. per acre*	64	114	78	75	123	63	n/a	n/a	n/a
Soybeans:										
Production	*1,000 bushels*	11,657	42,242	262	65,753	163,450	149	n/a	n/a	n/a
Acreage harvested	*1,000 acres*	577	1,124	95	2,673	4,484	68	n/a	n/a	n/a
Yield	*Bu. per acre*	20	38	86	25	36	48	n/a	n/a	n/a
Milk:										
Milk sold	*1,000 lbs.*	5,296	6,519	23	n/a	n/a	n/a	n/a	n/a	n/a
Cows	*Number*	632	505	-20	n/a	n/a	n/a	n/a	n/a	n/a
Yield	*Lbs. per cow*	8,376	12,915	54	n/a	n/a	n/a	n/a	n/a	n/a
Wheat:										
Production	*1,000 bushels*	n/a	n/a	n/a	n/a	n/a	n/a	62,621	117,064	87
Acreage harvested	*1,000 acres*	n/a	n/a	n/a	n/a	n/a	n/a	2,794	3,741	34
Yield	*Bu. per acre*	n/a	n/a	n/a	n/a	n/a	n/a	22	31	40

[1]Percentage difference.

n/a = Not computed for these regions.

Source: 1964 and 1987 censuses of agriculture.

400,000 farmers were aged 65 or older in 1990, and another 411,000 were between ages 55 and 64 (table 18). Thus, about 40 percent of American farmers were at least aged 55, and controlled about 40 percent of farmland and farm assets. There is concern about what will happen to their assets when these older farmers retire. The cohort analysis reported in the previous section suggests that at least half of farmers aged 55 and older would exit within 10 years. That would make available up to 220 million acres of farmland (more than 22 million acres per year), and farm assets valued at more than $170 million.

A comparison of the financial characteristics of young and older farmers leads to the conclusion that fewer young farmers can easily replace the large number of older farmers, if the transfer of assets across generations can be accomplished. Comparing characteristics of farmers under age 35 with those aged 65 and older finds that young farmers as a whole produce substantially more from a given amount of assets. Under-35 farmers are outnumbered nearly 2 to 1 by farmers aged 65 and older. Yet sales by farmers under age 35 were nearly identical to sales by farmers aged 65 and older, as was their net income. The age group with

Table 18--Characteristics of farms by age group, 1990

About 40 percent of farms are operated by persons aged 55 years or older.

Operator characteristic	Unit	Age of operator					
		Under 35	35-44	45-54	55-64	65 and older	All[1]
Farms	Thousands	205	363	381	411	391	1,752
Acres	Mil. acres	105	222	259	234	210	1,030
Owned	Do.	29	80	112	123	128	472
Rented	Do.	53	93	83	74	39	342
Acres operated per farm	Acres	512	612	680	569	538	588
Owned	Do.	141	221	294	299	327	269
Rented	Do.	258	256	218	181	99	195
Sales	Bil. dollars	14.5	30.4	27.1	24.1	14.6	110.7
Sales per farm	Thous. dollars	71	84	71	59	37	63
Net income	Bil. dollars	3.0	6.6	5.6	5.4	3.0	23.6
Assets	Mil. dollars	55	140	177	193	153	719
Liabilities	Do.	14	28	26	19	9	95
Equity	Do.	42	113	151	175	144	625
Debt-to-asset ratio	Do.	24.9	19.7	14.6	9.6	5.7	13.2
Corn for grain:							
Harvested acres	Mil. acres	8.8	15.8	14.0	11.5	4.6	54.5
Production	Mil. bushels	1,022	1,931	1,672	1,322	518	6,465
Production per acre	Bu./acre	117	122	120	116	112	119
Soybeans:							
Harvested acres	Mil. acres	8.1	12.9	12.2	11.7	6.5	52.3
Production	Mil. bushels	280	454	418	338	124	1,615
Production per acre	Bu./acre	35	35	34	34	30	34
Wheat:							
Harvested acres	Mil. acres	7.7	14.1	12.1	11.7	6.5	52.3
Production	Mil. bushels	301	551	452	434	239	1,977
Production per acre	Bu./acre	39	39	37	37	37	38

[1]Totals are not comparable with census of agriculture totals, because these data undercount small farms.
Source: 1990 USDA Farm Costs and Returns Survey (Bentley).

the greatest sales in 1990 was the 35- to 44-year-old group, which accounted for $30 billion of a total $110 billion in sales. Sales per farm was also highest for the 35- to 44-year-old group at $83,000.

In 1990, the sales of farmers under age 35 matched the sales of those aged 65 and older, and the sales of 35-44 year olds exceeded the sales of 55-64 year olds by 25 percent. Production and acreage of the three most important crops--corn, soybeans, and wheat--by farmers under age 45 exceeded that of farmers aged 55 and older by a considerable margin.

In terms of production per acre, a slight pattern of declining production per acre develops with age, although the differences are not statistically significant. If new entrants come in with the same characteristics as the current group of younger farmers, and the under-35 group expands the size of their operations, there should be no problem replacing the output of retiring farmers over the coming decade.

Young farmers rely on rented land, renting substantially more acres than they own, while

farmers aged 65 and older own more than four times as much land as they rent. Owned acres per farm rise from 141 for farmers under age 35 to 327 for farmers aged 65 and older. Rented acres per farm decline from more than 250 acres for farmers under age 45 to 100 acres for farmers aged 54 and older. These patterns reflect life-cycle patterns of land accumulation, where new farmers with limited financial resources rent most of their land, expand through rental and purchases as they gain experience, and shift from rented to owned acres later in their careers.

Young farmers are more leveraged than older farmers. Under-35 farmers' debts, on average, equaled 25 percent of their assets. The debt-to-asset ratio declines steadily with age, reaching less than 6 percent for the 65-and-older age group. This, like the decreasing dependence on rented land as farmers age, also results from life-cycle patterns of asset accumulation. Young farmers rely more on debt as they enter and become established in farming. Today's young farmers who prove to be successful will reduce their reliance on debt over the coming years as they use savings to build up their owned assets and gradually pay down debts. These young farmers will in turn be replaced by a new generation of highly leveraged young farmers.

Transferring Farm Assets to the Next Generation

The complex workings of markets for farmland and farm credit will determine who controls the assets of aging farmers after they retire. The disposition of these freed-up assets will determine, in large part, the structure of farming in the next decade. Will new young farmers acquire most of these assets, or will the assets be incorporated into existing farms? Some observers are concerned that difficulties obtaining adequate credit and low equity levels of young farmers handicap them when they compete with established farmers and nonoperators for the land and other assets of retiring farmers. If young farmers fail to acquire their customary share of land and assets, greater concentration of farm asset ownership will result.

In this section, I will examine patterns of land acquisition and financing by age group, and assess prospects for intergenerational transfer of farm assets. Finally, government programs and policies that affect farm asset transfers will be discussed.

Patterns of Farmland and Buildings Acquisitions

Earlier analysis in this report suggested that much of the land young entrants and expanding farmers acquired is obtained from aging farmers who are scaling back the size of their operations or leaving farming altogether. I discussed earlier the complexity of farmer retirement. Some aging farmers sell their land, while others rent out land. Many agricultural landlords are older persons who are retired farmers or the spouses of deceased farmers. The transfer of farm assets involves much more than the simple transfer of ownership of an intact farm unit from parent to children. It involves the decisions of aging farmers to make their land available for rent or purchase on the open market, as well as the decisions of entering or expanding farmers to acquire land.[11]

Table 18 shows that in 1990, younger farmers relied more on rented acreage than did older farmers. Data from a single year, however, cannot show the dynamics of land accumulation over time. Tracking acres of owned and rented land by age groups between the 1978 and 1987 Censuses of Agriculture can show patterns of land accumulation by farmers of various ages. These censuses were taken 9 years apart, so most of the farmers in a given 10-year age group in 1978 would be in the next oldest age group in 1987. For example, farmers who were 25-34 years old in 1978 would mostly be in the 35-44 age group in 1987. By comparing the average acreage of 25-34 year olds in 1978 with the acreage of 35-44 year olds in 1987, we can get a rough idea of how the members of a birth-year cohort changed their acreage over time. The analysis was limited to farmers whose principal occupation was farming (see also Gale, 1992 and 1994).

Average acres owned per farm for 1978 and 1987 for each age group from under-25 to 65 and older are plotted in figure 7. Points corresponding to a particular cohort are connected with a line. For example, the point representing average acres for 25-34 year olds in 1978 is connected to the point representing average acres of 35-44 year olds 1987.

[11] In a survey of beginning farmers in North Dakota, 54.3 percent reported obtaining land from a retiring farmer, and 12 percent said the previous owner of their land died (Leistriz and others). Among individual and partnership owners of agricultural land, 55 percent of nonoperator owners are at least 65 years old; more women than men are agricultural landlords (Wunderlich).

Members of this cohort increased average owned acres from 224 to 369 over the 1978-87 period. Figure 7 suggests that farmers accumulate owned land at a fairly steady rate up until the 45-54-year-old age group. For older farmer cohorts, the increase in owned acres between 1978 and 1987 is very slight. Differences between birth-year cohorts also become apparent. For example, farmers aged 45-54 in 1978 owned an average of 422 acres compared with 487 acres for farmers aged 45-54 in 1987.

A similar graph was plotted for rented acres between 1978 and 1987, but the pattern that emerges is somewhat different from that for owned acres (fig. 8). Rented acres show a concave, or inverted-U, pattern over the farmer's lifetime. The youngest farmers increased rented acreage between 1978 and 1987 from 207 acres to 390 acres per farm. The rate of increase declines with age, and farmers aged 45 or older decreased their rented acreage between 1978 and 1987. Differences between cohorts are also apparent. Members of more recent cohorts rented more acres, on average, than their older counterparts did at the same age. In general, farm operators have come to rely more on rental of land in recent years. Overall, for farmers whose principal occupation is farming, acres of owned land decreased by 8 million acres between 1978 and 1987 and rented land increased by 18 million acres.

The trend toward reliance on rented land may partly be a response to low returns from farmland ownership in a noninflationary economy with stagnant food demand. Land values adjusted for inflation grew by 33 percent during the 10 years from 1952 to 1962, 43 percent between 1962 and 1972, then by 72 percent during 1972-82. During the most recent decade, however, from 1982 to 1992, real land values fell by 46 percent. Most of that decline was during the mid-1980's farm financial crisis, but real land values have continued their decline during the early 1990's.[12]

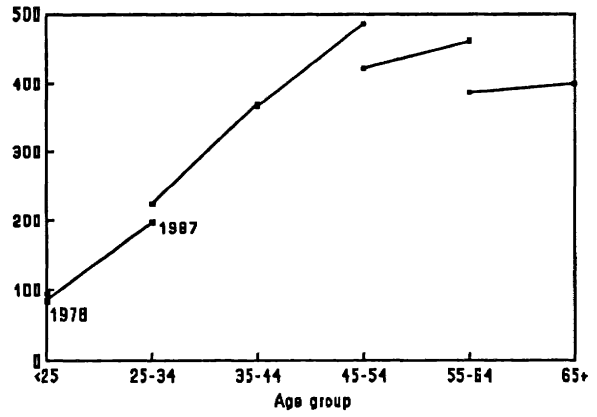
The overall patterns reflect life-cycle aspects of land accumulation. Young farmers, typically with more limited financial resources than older farmers, rely on rental to begin farming and to expand their operations. As they gain experience and financial resources, they gradually acquire ownership of more farmland. At the peak of their careers they gradually cut back on rented acres, as they acquire ownership of a greater share of the acreage they operate.

[12]Computed from USDA estimates (Jones and Canning) deflated with the Consumer Price Index.

Figure 7

Owned acres per farm, by age of operator, 1978 and 1987

Farm operators accumulate owned land at a steady rate up to about age 50.

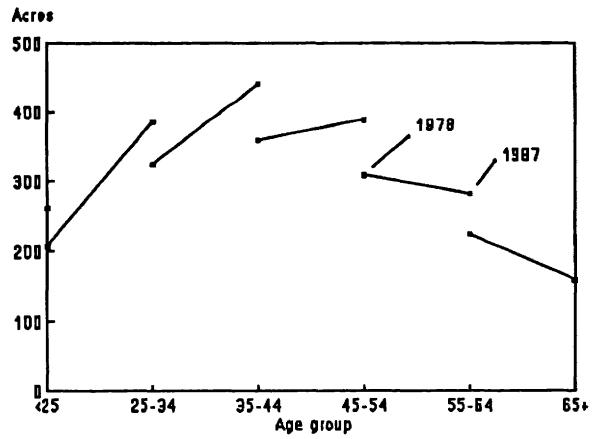


Source: Census of agriculture.

Figure 8

Rented acres per farm, by age of operator, 1978 and 1987

Farmers were more reliant on rented acres in 1987 than were farmers of the same age in 1978.



Source: Census of Agriculture.

Keeping in mind the life-cycle pattern of farmland acquisition, we now look in more detail at how farmers of different age groups and nonfarmers acquired farmland in 1988. The 1988 Agricultural Economics and Land Ownership Survey (AELOS) by the Census Bureau reports information about land acquisition by different age groups of farmers and nonoperator landowners. These data come from a 1988 survey of a sample of farmers who responded to the 1987 Census of Agriculture. Landlords who rented out agricultural land were also surveyed. The

survey did not cover farmers who began operating a farm in 1988 or farmers who ceased operating between 1987 and 1988. About 9 percent of farmers surveyed were no longer in operation in 1988. The data are only for farmers who were operating a farm in both 1987 and 1988, and their landlords.

I compared the under-35 and 35- to 44-year-old age groups, the ages where farm expansion is most common, with farmers aged 45 and older and with nonoperators. In 1988, about 75,000 farm operators acquired 9.1 million acres of farmland and buildings valued at $5.5 billion, while 26,000 nonoperators acquired 5.2 million acres valued at $3.5 billion. About 16,000 farm operators under age 35 acquired about 1.5 million acres of land, another 16,000 farmers between ages 35 and 44 acquired 1.4 million acres, and their acquisitions were valued at $159 billion and $106 billion (table 19). Though they only number about a fourth of all farm operators, farmers under age 45 acquired more land than those aged 45 and older. The share of acquired land was fairly even across ages, but proportionately younger farmers were more active in acquiring land and buildings to expand their operations. The younger farmers, though fewer in numbers, had the highest percentage of operators acquiring land and buildings, the highest average value per acquisition, and the most acres per acquisition.

About a third of farmland and buildings acquisitions in 1988 were by nonoperators. The average size and value of their acquisitions was greater than for any age group of farmers. Although nonoperator owners acquired a large amount of farmland, they also sold a nearly equal amount, so they did not increase the total amount of farmland they held in 1988. More nonoperators sold land than bought land, so ownership among nonoperators became more concentrated. Operators reported acquiring about 6.5 million acres of land more than they reported selling, suggesting an increase in land in farms, but USDA statistics report that total land in farms decreased between 1987 and 1988. This apparent contradiction can be resolved by recognizing that farmers who exited in 1987 or 1988

Table 19--Farmland and buildings acquisitions and financing, by age of operator and nonoperators, 1988

Commercial banks are the most important source of financing for farmland acquisitions.

Item	Unit	Operator age			Nonoperator Landowners
		Under 35	35-44	45 and older	
Number of operators and landowners	1,000	245	347	1,880	1,775
Landowners acquiring land during 1988	Do.	16	16	43	26
Acres acquired	1,000 acres	2,598	1,668	4,782	5,187
Acres per acquisition	Acres	159	106	111	198
Value of acquisitions	Mil. dollars	1,545	1,356	2,605	3,493
Value per acquisition	1,000 dollars	94	86	61	133
Amount financed	Mil. dollars	612	457	797	478
Percent financed	Percent	40	34	31	14
Sources of financing:	Percent of				
Federal Land Banks	financing	20	21	21	16
Farmers Home Administration	Do.	6	1	1	0
Insurance Companies	Do.	4	2	2	4
Commercial Banks	Do.	35	46	40	28
Other	Do.	36	30	36	52
All sources	Do.	100	100	100	100

Source: U.S. Department of Commerce, 1990.

were not surveyed and therefore did not report selling land in 1988. If operators acquired at least 6.5 million acres of land from these exiting farmers, the land acquisition data would be consistent with the decrease in farmland in 1988.

Farmland markets were less active in 1988 compared with previous years, probably due to high debt levels for many farmers in the aftermath of the mid-1980's farm financial crisis. Compared with the 15.2 million acres acquired in 1988, operators and nonoperators combined reported acquiring 119.5 million acres from 1983 to 1987, an average of nearly 24 million acres per year. If half of the 444 million acres controlled by farm operators aged 55 and older in 1990 becomes available between 1990 and the year 2000, there would be an average of 22.2 million acres per year on the market, much higher than the 15.2 million acquired in 1988, but comparable to acquisitions in earlier years. If acquisition patterns of 1988 hold up, nonoperators would acquire about 35 percent, and farmers younger than age 45 would acquire about 20 percent. Young farmers would acquire ownership of a relatively small share of land becoming available, but farmers under age 45 account for about 38 percent of rented land, so it is likely that at least a third of the land acquired by nonoperators would be rented to young farmers.

One of the key determinants of how the transfer of assets across generations will occur is the operation of farm credit markets. According to agricultural lenders and other observers, beginning farmers usually cannot meet the desired levels of equity, collateral, downpayments, projected cash flow, and experience that commercial and Farm Credit System banks require. Even the more lenient requirements of the Farmers Home Administration are often out of reach for beginning farmers (U.S. General Accounting Office). As a result, young beginning farmers are believed to have difficulty obtaining financing for land and building acquisitions.

Farm operators needed more than $1.8 billion in financing to acquire farmland and buildings in 1988, while nonoperators needed $478 million (table 19). More than $1 billion of the total for operators was accounted for by farmers under age 45. However, most farmland acquisitions were not reliant on financing. Farmers under age 35 were most reliant on financing, but they financed only 40 percent of the value of land acquisitions. This compares with 31 percent for farmers aged 45 and older. In contrast, nonoperators financed only 14 percent of acquisition value. Nonoperators and older operators are clearly at an advantage in acquiring farmland and buildings, because they are often able to acquire property without debt.

Commercial banks were the leading source of credit for land and buildings acquisitions by farmers in 1988, but commercial banks accounted for less than half of financing (table 19). This contrasts with data on total farm debt by source, which show that the largest share is held by Farm Credit System lenders, including Federal Land Banks and Production Credit Associations (U.S. Department of Agriculture, Economic Research Service). However, the large share of new borrowings in 1988 from commercial banks is consistent with their recent gains in market share. Farmland owners use diverse sources for obtaining credit. The "other" category, which includes seller financing, was the second-largest source of credit for farm operators. The under-35 age group acquired nearly equal shares of financing from commercial banks (35 percent) and "other" sources (36 percent). Federal Land Banks provided about 20 percent of financing for farm operators. Farmers Home Administration and insurance companies provided small shares of total financing, although farmers under age 35 were more likely to use these sources than were older farmers.

Family Connections and Landownership

There has been some concern expressed that the large capital requirements in farming confine access to young persons who have family connections. This is in step with the longstanding concern over whether inheritance of wealth from generation to generation within a family encourages the concentration of wealth in relatively few hands. Indeed, while farmers as a group earn incomes comparable to nonfarm families, their wealth far exceeds that of nonfarm families. The average equity per farm for operators under age 35 (computed from data in table 18) exceeds $200,000, while the median wealth of all U.S. households headed by a person under 35 is under $7,000.[13]

Acquisition of farmland is typically viewed as the major obstacle to prospective farm entrants. Machinery and livestock often require substantial investments, but land is the dominant asset, in terms of value, on most farm balance sheets. About two-thirds of principal farm operators under age 35 owned land in 1988. Of those, 34 percent had

[13]In 1989, the median net worth of households under age 35 years was $6,800 (U.S. Dept. Commerce, 1992).

purchased land from a relative and 17 percent obtained some land through inheritance or as a gift (table 20). As a share of total acreage owned by under-35-year-old operators, land purchased from a relative accounted for 29 percent, and land received as an inheritance or gift accounted for 15 percent. Thus, more than 40 percent of land owned by farmers under age 35 was acquired from family members. For the under-35 age group, 53 percent of owned land was purchased from a nonrelative. For young farm operators who own land, family connections are an important source of ownership.[14]

Data on sources of farmland ownership for operators of all ages show slightly more purchased from nonrelatives (58 percent), slightly less purchased from relatives (22 percent), and a nearly equal share obtained as an inheritance or gift (16 percent), when compared with farmers in the under-35 age group. Rogers and Wunderlich concluded from this data that turnover of farmland is slow, with only 3.5 percent changing hands per year. They also pointed out the "thinness" of the farmland market, with less than 2 percent of farmland purchased in open market transactions (from nonrelatives) each year.

[14]The importance of family connections may vary across regions. The survey of North Dakota beginning farmers by Leistritz and others found that only 42 percent of beginning farmers owned land. Of that 42 percent who owned land, 62.1 percent bought land from a relative, 3.7 percent received it as a gift or inheritance, and only 34.2 percent bought land from a nonrelative.

Most young persons who enter farming reduce capital requirements by renting most or all of their land. Owned land accounts for only about 30 percent of all land in farms controlled by operators under age 35.[15]

About 30 percent of farmers under age 35 rented all the land they operated in 1987. The role of family assistance in farmland rental is unclear, but it may be significant. One survey of beginning farmers in North Dakota found that 57 percent rented land from a relative, so rental could be an important source of family assistance (Leistritz and others). We have no comprehensive information about how much land is rented from family members. The role of family assistance in acquisition of machinery, equipment, and livestock is also unclear, but could be significant.

The importance of family help diminishes over a farmer's career, as most farmers expand the size of their land holdings substantially over the course of their lifetimes (Gale, 1994). The ability to amass the large amounts of wealth U.S. farmers commonly hold, without primary reliance on family assistance, suggests substantial entrepreneurial ability on the part of American farmers.

[15]Using the 1987 Census of Agriculture, farm operators under age 35 owned 33.6 percent of the land they operated, but using the 1988 follow-on AELOS survey, they owned 29 percent.

Table 20–Source of landownership for U.S. farm operators under age 35, 1988

A minority of young farmers obtain farmland from family members.

Item	Total owned acres	Share of owned acres	Farms reporting	Percent of farms[1]	Acres per reporting farm
	1,000 acres	*Percent*	*Number*	*Percent*	*Acres*
Source of ownership:					
Purchased from nonrelative	12,953	53	96,086	62	135
Purchased from relative	7,064	29	52,504	34	135
Inheritance or gift	3,737	15	25,690	17	145
Other	565	2	5,198	3	109
Total	24,320	100	154,243	[2]	158

[1]Column shows percentage of farms with owned land reporting each source of ownership.
[2]Categories are not mutually exclusive, therefore do not add to 100.
Source: 1988 Agricultural Economics and Land Ownership Survey, U.S. Dept. Comm., Census Bureau.

Government Policies That Affect Farm Entry

Few government policies have been aimed directly at affecting entry and exit of farmers. The 1990 Farm Bill directed the Farmers Home Administration (FmHA) to target some of its resources to beginning farmers. The FmHA was required to define "beginning farmer" and to give them priority in purchasing inventory farm property the agency held. However, the FmHA did not implement other provisions that called for targeting loan funds to beginning farmers because of uncertainties over whether the FmHA's authorizing legislation permitted this. New farmers could obtain funds through programs available to all farmers, but they often have difficulty meeting even the relatively lenient lending criteria the FmHA used (U.S. General Accounting Office).

The Agricultural Credit Improvement Act (P.L. 102-544), signed into law in October 1992, authorized the FmHA to target financial assistance to beginning farmers and ranchers. This legislation required the FmHA to offer, as part of its Farm Ownership program, downpayment loans to farmers with 5 to 10 years of experience for up to 30 percent of the purchase price of a farm or ranch at an interest rate of 4 percent to be paid back over 10 years. The farmer is expected to put up 10 percent of the purchase price, and the remaining 60 percent should be financed by another lender. Implementation of an operating loan program directed at farmers with fewer than 5 years' experience was also required. The law required applicants to present a detailed plan that establishes the financial viability of the proposed farm operation. Borrowers under the program are expected to graduate to commercial credit within 10 years.

State governments have been more active than the Federal Government in enacting beginning farmer assistance programs, although a number of these programs have been allowed to lapse into inactivity. As many as 30 States could have programs in various stages of activity, but the number of beginning farmers assisted is very small. The most common method used is to back private loans or contract sales with tax-exempt "aggie bonds." Interest paid by the beginning farmer is tax-exempt, allowing the lender to offer a lower interest rate. These programs have struggled due to limited funding and uncertainties over extension of the Federal legislation authorizing aggie bonds, which expired in June 1992. State programs could receive a boost from the Federal Agricultural Credit Improvement Act, which provides for the FmHA to either guarantee beginning farmer loans made by States or provide a downpayment for such loans.

Other programs match retiring farmers with prospective new entrants, sometimes forming a mentor type of relationship. The leading program of this type is the Land Link project sponsored by the Center for Rural Affairs in Walthill, Nebraska. Land Link includes a computerized clearinghouse for matching prospective beginning farmers with landowners willing to help new farmers, educational programs for beginning farmers, and a farm management service that provides specialized services to landowners who want to lease land to beginning farmers. A fund for financing beginning farmers is also being developed. These programs have provided assistance to a modest number of entering farmers. A number of nonprofit organizations and State government entities are at various stages in developing similar programs.

Government commodity programs that support commodity prices or provide producers with deficiency payments do not necessarily help entering farmers. In fact, they may make entry more difficult. Government payments through most programs are tied to production, thus a large share of the subsidies generally go to relatively few large producers. The value of farm subsidies also causes farmers to bid up the price of farmland where subsidized crops are grown. More expensive farmland makes entry more difficult for beginning farmers.

Some government policies indirectly affect entry by influencing the intergenerational transfer of assets. For example, estate and inheritance taxes discourage the intact transfer of family farms from one generation to the next. When aging farmers hold land until death, high estate taxes can force heirs to sell off farm assets to pay tax liabilities. Concern about this has led to enactment of tax code provisions that allow estate tax liabilities on farm property to be reduced. These include deferred payment of estate taxes and special use valuation of estates containing farm property. Gifts to family members of less than $10,000 per year per donee can also be made before death. Currently, estates of up to $600,000 may be transferred tax-free. The average net worth of farmers aged 65 and older in 1990 was $369,000, so most farmers fall below the $600,000 limit. But for many family farmers, careful estate planning is important.

Capital gains taxation likely plays a role in reducing the rate at which aging farmers retire from farming.

Farmers who are at retirement age acquired much of their farmland before and during the inflationary 1970's. These farmers experienced considerable nominal gains in the value of their land, but the real gains (adjusted for inflation) are modest, and often negative. The prospect of capital gains taxes surely discourages aging farmers from selling off their land, encouraging many to hold on to the land until advanced ages. Further incentive to hold land until death is provided by a stepped-up tax basis, which allows a farmer's heirs to compute capital gains taxes when selling inherited farm property based on the market value of the property at the time of the farmer's death. This restricts the supply of land available for purchase by new entrants and expanding farmers. The incentives the tax code created may account for the low rate of farmland turnover observed by Rogers and Wunderlich.

Elimination of stepped-up basis, reduction of capital gains taxes, or indexing capital gains for inflation would encourage aging farmers to sell their land, raise exit rates of older farmers, and hasten the decline in farm numbers. However, more land would be available on the open market for beginning farmers. The greater supply of land on the market could reduce land prices. This could help beginning farmers, but would also benefit established farmers seeking to expand. Given the lower credit-worthiness of young farmers, a large share of the extra land on the market would likely be sold to more experienced farmers and nonoperators.

Farmers have recently encountered increasingly numerous and complex regulations regarding environmental issues, labor management, and water use. Compliance with these regulations often requires special expertise and equipment that increase the cost of farm entry. If these costs are primarily fixed or lumpy, involving the acquisition of training or the purchase of equipment or services, modest-sized farms and new entrants may be less able to bear regulatory costs than larger farms, where costs of compliance can be spread over larger outputs. Thus, increased regulation of agriculture may reinforce the trend toward fewer, larger farms.

Conclusions

An imbalance of new young farmers against departing older farmers may continue the modest declines in farm numbers through the coming decade. More than 40 percent of U.S. farmers are at least 55 years old, but the number retiring now is much lower than that of the 1950's and 1960's. Large net exits of farmers between ages 35 and 54 that produced rapid declines in farm numbers in earlier decades have been halted as farm household incomes approached nonfarm household incomes. The small number of entrants results from economic and demographic effects. Many potential farm entrants view lifetime earnings prospects in farming as poor when compared with other occupations. The pool of potential young entrants has traditionally been limited to persons raised on farms, and the size of this pool is shrinking rapidly.

Trends will differ across regions. In most Southern States, entry is low compared with the number of older farmers, thus farm numbers will decline the fastest in the South. In the Northeast, Great Plains, and Western parts of the Nation, farm numbers will likely remain stable. National trends will reflect the modest decline in farm numbers expected for the Midwest, where the bulk of the Nation's farms are located.

Some observers have portrayed the aging of the Nation's farmers as a sign of impending crisis and radical changes in the structure and organization of the farm sector. Concern has arisen on several fronts. Some question whether the declining number of farmers will be able to maintain the Nation's food supply. Others fear that low farm entry by young persons will lead to greater concentration of farmland ownership in the hands of fewer wealthier owners, including nonfarm corporate and foreign interests. Farm-based rural communities also fear decline due to declining farm numbers.

This report suggests that changes will be slow and gradual, mainly a continuation of past trends toward fewer and larger farms. There will likely be change in the social structure of farm-based communities and changes in the way farms are operated, but most Americans will never notice any effects of the trend toward fewer farms. For the most part, increasing productivity of farmers indirectly caused the decline in farm numbers. Improved technology and management techniques let farmers expand output by making the best use of scarce resources. The relatively static demand for food means that greater productivity depresses prices, forcing some producers out. In the 1990's, this means that many retiring farmers will be replaced by fewer, highly productive new farmers. Young persons who might have entered farming are channeled into alternative careers producing nonfarm goods and services. By maintaining low food prices, this process benefits consumers by freeing up dollars for spending on

nonfood items. Low prices also help producers by making their products competitive in world markets.

The key issue to be concerned about is whether low farm entry is due to market signals (such as higher, less risky earnings in nonfarm careers) that steer potential entrants away from farming, or entry barriers (such as large capital requirements or lack of credit) that prevent qualified, interested people from entering farming. To the extent that it is due to market signals, low farm entry is not a problem. However, if entry barriers are an important cause, there may be some justification for government intervention. It appears that most of the decline in entry is due to market signals, and that entry barriers play a minor role.

I found no clear evidence of entry barriers, but the role entry barriers played is very difficult to gauge. For example, it is impossible to measure how many qualified persons tried to enter farming, but were not able to. Many young farmers probably face disadvantages in competing for land and other assets because they have less equity and have more difficulty obtaining commercial bank loans than older farmers or nonfarmers who buy farmland. Prospective lenders often view young farmers with little equity and experience as risky loan prospects. However, a large number of young farmers are able to enter farming and perform successfully without government or family assistance. For most who choose farm careers, the large capital requirements and credit difficulties probably mean that it takes longer for them to get started farming on their own and that they have to be creative in finding financing. Also, many barriers to farm entry are nonfinancial, including regulatory compliance costs and farm-specific knowledge and expertise.

Farm operators appear to be increasing their reliance on farmland rental as opposed to ownership. Land rental permits farmers to take advantage of economies of scale of large farms with a smaller capital investment, and permits entry by young farmers with limited financial resources. Active land rental markets also facilitate the allocation of scarce farmland to the most productive farmers who can use the land most effectively, but may lack the capital resources to purchase it. In this way, increasing rental of farmland can be viewed as a positive development. However, increasing rental may be troubling because it suggests greater landholding by nonoperators. Greater dependence on renting also suggests less inclination for farm operators to make long-term investments in land improvements and soil conservation. In this respect, the trend toward greater rental would retard the adoption of sustainable farming systems and conservation practices.

Another important trend changing the way farms are managed and financed is the increasing vertical integration in agriculture. Barry and others suggest that the decline in farm numbers and the increasing size of commercial farms, combined with greater attention to farm product quality/characteristics by processors, have contributed to the increasing prevalence of formal contracting relationships between processing firms and producers of some products. Input suppliers have also developed contracting relationships with farms. As commercial farm operations become larger and fewer in number, and production for niche markets becomes more important, farmers become more inclined to produce on contract. These arrangements have become common in production of poultry, hogs, vegetables, and many specialty crops. Because contractors often furnish variable inputs and livestock inventory, and coordinate financing of buildings and equipment, contract production may allow entry by persons with lower equity levels (Featherstone and Sherrick). Vertical integration of farmers with processors and input suppliers will likely become more common, and through such links nonfarm businesses will have a greater role in farm production.

References

Ahearn, M.C., J.E. Perry, H.S. El-Osta. 1993. *The Economic Well-Being of Farm Operator Households, 1988-90.* AER-666. U.S. Dept. Agr., Econ. Res. Serv.

Barry, P.J., S.T. Sonka, and K. Lajili. 1993. "Vertical Coordination, Financial Structure, and the Changing Theory of the Firm," *American Journal of Agricultural Economics*, 74(5):1,219-25.

Bentley, Susan E. 1993. *Farm Operating and Financial Characteristics, 1990.* SB-860. U.S. Dept. Agr., Econ. Res. Serv.

Clawson, M. 1963. "Aging Farmers and Agricultural Policy," *Journal of Farm Economics*, 45(1):13-30.

Edwards, Clark, M.G. Smith, and R.N. Peterson. 1985. "The Changing Distribution of Farms by Size: A Markov Analysis," *Agricultural Economics Research*, 37(4):1-16.

Featherstone, A.M., and B.J. Sherrick. 1993. "Financing Vertically Coordinated Agricultural Firms," *American Journal of Agricultural Economics*, 74(5):1,232-37.

Gale, Fred. 1992. "How Young Farmers Accumulate Farmland," *Agricultural Income and Finance Situation and Outlook Report.* AFO-46, pp. 30-33. U.S. Dept. Agr., Econ. Res. Serv.

_____. 1993. "Why Did the Number of Young Farm Entrants Decline?," *American Journal of Agricultural Economics*, 75(1):138-146.

_____. 1994. "Longitudinal Analysis of Farm Size Over the Farmer's Life Cycle," *Review of Agricultural Economics*, 16(1):113-23.

Gale, Fred, and David Henderson. 1991. *Estimating Entry and Exit of U.S. Farms.* Staff report AGES-9119. U.S. Dept. Agr., Econ. Res. Serv.

Herr, W.M. 1974. "Who You Are: A Statistical Close-up of Conferees," *Financing Young Farmers: Report of the Conference on Financial Needs of Young Farmers.* Washington, DC: Farm Credit Administration.

Jones, John, and P.N. Canning. 1993. *Farm Real Estate: Historical Series Data, 1950-92.* SB-855. U.S. Dept. Agr., Econ. Res. Serv.

Kanel, D. 1963. "Farm Adjustments by Age Groups, North Central States, 1950-1959," *Journal of Farm Economics*, 45(1):47-90.

Leistritz, F.L., B.L. Eckstrom, J. Wanzek, and T.L. Mortenson. 1989. *Beginning Farmers in North Dakota.* North Dakota State University. Agr. Econ. Rept. No. 249.

Lin, William, George Coffman, and J.B. Penn. 1980. *U.S. Farm Numbers, Sizes, and Related Structural Dimensions: Projections to Year 2000.* TB-1625. U.S. Dept. Agr., Econ. and Stat. Serv.

Reimund, D.A., and Fred Gale. 1992. *Structural Change in the U.S. Farm Sector, 1974-87.* AIB-647. U.S. Dept. Agr., Econ. Res. Serv.

Rogers, Denise, and Gene Wunderlich. 1993. *Acquiring Farmland in the United States.* AIB-682. U.S. Dept. Agr., Econ. Res. Serv.

Shryock, H.S., and Associates. 1976. *The Methods and Materials of Demography* (condensed edition by E.G. Stockwell). Orlando: Academic Press.

Smith, M.G. 1987. "Entry, Exit, and the Age Distribution of Farm Operators, 1974-82," *Journal of Agricultural Economics Research*, 39(4):2-11.

Stam, J.M., S.R. Koenig, S.E. Bentley, and H.F. Gale, Jr. 1991. *Farm Financial Stress, Farm Exits, and Public Sector Assistance to the Farm Sector in the 1980's.* AER-645. U.S. Dept. Agr., Econ. Res. Serv.

Tolley, G.S., and H.W. Hjort. 1963. "Age-Mobility and Southern Farmer Skill: Looking Ahead for Area Development," *Journal of Farm Economics*, 45(1):31-46.

U.S. Congress, Office of Technology Assessment. 1986. *Technology, Public Policy, and the Changing Structure of Agriculture.* OTA-F-285.

U.S. Department of Agriculture. Various years. *Agricultural Statistics.*

U.S. Department of Agriculture, Economic Research Service. May 1992. *Agricultural Income and Finance Situation and Outlook Report.* AFO-45.

U.S. Department of Commerce, Bureau of the Census. Various years. *Census of Agriculture.*

_____. Various years. *Census of Population.*

_____. 1990. *Agricultural Economics and Land Ownership Survey (1988).* AC87-RS-2.

_____. 1992. *Statistical Abstract of the United States: 1992.*

U.S. General Accounting Office. 1993. *Farm Finance: Number of New Farmers is Declining.* GAO/RCED-93-95.

Wunderlich, Gene. 1991. *Owning Farmland in the United States.* AIB-637. U.S. Dept. Agr., Econ. Res. Serv.

Appendix: Cohort Analysis Methodology

I computed net entry rates for age groups by looking at how the number of farmers in a birth-year cohort changed between two censuses. For example,

comparing the number of 25- to 34-year-old farmers in 1982 with the number of 30- to 39-year-old farmers in 1987 shows an increase of 15 percent, showing net entry in that age cohort. In general, suppose there are N farm operators ages A to B in year t. Then, k years later in year t+k we observe M farm operators ages A+k to B+k. The gross number of entrants in this cohort is represented by E, and the number of gross exits by X, thus M = N + E - X. The ratio of cohort sizes in years t+k and t, M/N, can be expressed as,

$$(1) \qquad b = \frac{N + E - X}{N}.$$

If entries exceed exits, then the ratio will be greater than 1, signifying net entry. If exits are greater than entries, then b will be less than 1. The ratio b can be rearranged and expressed in terms of net entry rate,

$$(2) \qquad b = 1 + [(E-X)/N].$$

There is net entry if (E-X)/N is positive, and net exit if (E-X)/N is negative.

Cohort analyses are usually performed on decennial censuses, and they trace out the size of each birth-year cohort over time (Clawson; Kanel; Tolley and Hjort). The irregular spacing of censuses of agriculture in recent decades does not allow this type of analysis. Instead, I used cohort analysis to compute net entry/exit rates by age group between census years. To project farm numbers, I took the estimated cohort ratios, b_j, estimated from past censuses for each age group j, and multiplied them by the current number of farmers in each age group in the base year t, N_{jt}. The age groups were in 5-year intervals: under 25, 25-29, 30-34, and so on, up to 70 or older. When 5-year age groups were not tabulated in published data, I interpolated with the method discussed below.

Age groups are tabulated by 10-year age breaks in the census of agriculture. When censuses are 4 or 5 years apart, more detailed tabulations are needed. For example, the number of 25-34 year olds in 1978 must be compared with the number of 29-38 year olds in 1982. To get around this problem, I interpolated 10-year age distributions to approximate single-year age distributions with a method also used by Smith. Shryock reports a set of Karup-King coefficients that may be used to divide distributions into tenths, taking into account the shape of the overall distribution. Using these coefficients, I computed single-year age distributions and then recombined them to form the age breaks that were needed. I checked the interpolated results against 5-year tabulations that were published for age groups 45 and older in 1987, and found that the interpolations came quite close to the actual values.

For the 1982-87 period, the b_j parameters were for cohort size changes over 5 years. This means that the members of each age group would move into the next 5-year age group, thus $N_{jt}b_j = N_{j+1,t+5}$. However, the 1978-82 period was only a 4-year period, thus the projections based on 1978-82 coefficients were for t+4. The age groups of the cohorts after 5 years, therefore, would not match the beginning age groups. That is, the 25- to 29-year-old cohort in 1987 would be 29-33 years old 4 years later in 1991. I interpolated the projected age distribution and recombined the numbers to fit the original age groups: that is, the age groups 24-28, 29-33, 34-38, etc. were recombined to form the age groups <25, 25-29, 30-34, etc., in year t+4. For the average analysis, I used a simple average of the 1978-82 and 1982-87 coefficients, and assumed that the average coefficients were for a 5-year time period. Entry rates over the 4-year 1978-82 period were much higher than during the 5-year 1982-87 period, and exit rates were about the same. It is unlikely that entry rates will again reach such high levels. It is not clear whether retirement rates are in secular decline or whether they were temporarily low during the 1982-87 period.

In matrix notation, we have an 11x1 vector of farm numbers by age group in year t, $\mathbf{N}_t$, and an 11x11 transition matrix,

$$\mathbf{B} = \begin{bmatrix} 1 & 0 & 0 & \dots & 0 & 0 \\ b_0 & 0 & 0 & \dots & 0 & 0 \\ 0 & b_1 & 0 & \dots & 0 & 0 \\ 0 & 0 & b_2 & \dots & 0 & 0 \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ 0 & 0 & 0 & \dots & b_{10} & b_{11} \end{bmatrix}$$

Most of the elements of **B** are b_j coefficients. The 1 in the top left corner of **B** means that the number in the youngest age group is assumed to remain constant. There is no base number N_0 for the youngest age group, those under 25 years old, after 1987. For 1992, I chose a reasonable value for the

number of under-25-year-old farmers between the 1982 and 1987 values and assumed that it would remain constant from 1992 on. In the bottom row, corresponding to the oldest age group, b_{10} represents the percentage of 65-69 year olds who survive and enter the 70+ age group in year t+5, and b_{11} is the number of 70+ year olds who survive and remain in that group.

A predicted set of farm numbers by age group in year t+5 can be computed by the matrix equation $\mathbf{N}_{t+5} = \mathbf{B}\mathbf{N}_t$. Premultiplying $\mathbf{N}_{t+5}$ by $\mathbf{B}$ gives the projection for t+10. In particular, the projection for year 2002, 15 years after 1987 (currently the most recent census year), is computed as $\mathbf{N}_{2002} = \mathbf{B}^3\mathbf{N}_{1987}$, where $\mathbf{B}^3$ represents three premultiplications.

Historical values for net entry/exit rates (b_j-1) from 1950 to 1987 are shown in table 14 in the text. During most years, there is net entry for farmers aged 35, and net exit for farmers aged 45 and older. Until 1974, the 35-44 age group experienced modest net exits, but that temporarily turned around from 1974 to 1982 when there was net entry. An abrupt decline in net exit for 45- to 59-year-old farmers and an increase in net exit for farmers under age 45 is apparent after 1974. Net exits of those aged 60 and older also declined to about 30 percent after 1978.

U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT #SB-884

Large, Specialized Farms Bring Most Profits; Small Farms Show Most Losses

June 1994

Contact: Charles B. Dodson, (202) 219-0801

A new report gives detailed information on farm business profits during 1987-91 among the various U.S. regions, farm types, and sizes of enterprise. The report, *Profitability of Farm Businesses: A Regional, Farm Type, and Size Analysis,* from the USDA's Economic Research Service, uses recent data to show the wide income variance among farms, a third of which are not profitable, and shows the major part played by larger and more specialized farms in the total production of U.S. agriculture. Average returns on assets including capital gains are determined for farms of various regions, types, and sizes. Farm incomes are compared against the returns of U.S. Treasury bills on the same value of capital investment.

Major Producers Are Specialized

Specialized farms controlled nearly 72 percent of all farm business assets in 1987-91. Over 50 percent of U.S. beef production came from specialized beef farms with annual sales of more than $100,000. Dairy farms with annual sales of more than $250,000 accounted for 47 percent of U.S. dairy production. About 35 percent of all cotton was produced on farms with annual sales greater than $250,000.

A single commodity accounted for over 50 percent of total production on nearly 70 percent of U.S. farms and sometimes made up almost all production. On specialized cotton, fruit and nut, nursery, peanut, tobacco, and vegetable farms, the specialized commodity made up more than 75 percent of individual farm production.

Larger Farms Are Much More Profitable

Larger farms tended to show the highest incomes, with many receiving cash incomes of more than $100,000 a year. Farms with annual sales greater than $250,000 represented 7 percent of all farms but controlled 50 percent of total U.S. production. Farms with annual sales of more than $50,000 accounted for two-thirds of the production of fruit and nuts, vegetables, cotton, nursery products, and sugar beets.

Some Smaller Farms Showed Profits

During 1987-91, farms with annual sales of less than $40,000 contributed only 9 percent of total production, compared with farms with sales of $250,000 or more, which contributed 51 percent of total U.S. production. The smaller farms represented 68 percent of all farms and controlled 41 percent of all assets, but they contributed less than 20 percent of production of most commodities. These farms were most likely to report negative returns. A third of all U.S. farms had negative incomes. But, small was not always unprofitable. Some small farms showed profits; what made some small farms profitable is not clear.

To Order This Report...

The information presented here is excerpted from ***Profitability of Farm Businesses: A Regional, Farm Type, and Size Analysis***, SB-884, by Charles B. Dodson. The cost is $9.00.

To order, dial **1-800-999-6779** (toll free in the United States and Canada) and ask for the report by title.

Please add 25 percent to foreign addresses (including Canada). Charge to VISA or MasterCard. Or send a check (made payable to ERS-NASS) to:

ERS-NASS
341 Victory Drive
Herndon, VA 22070.

We'll fill your order by first-class mail.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1994 386-122/00338